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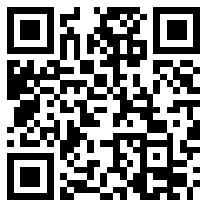

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THE CHINA SEA DIRECTORY,

VOL. I.

FIFTH EDITION, 1906.

NOTICE TO MARINERS.

(To be inserted inside cover of all Sailing Directions.)

CAUTION WHEN APPROACHING BRITISH PORTS.

(1) My Lords Commissioners of the Admiralty, having taken into consideration the fact that circumstances may arise in which it may be necessary, on account of periodical exercises, manœuvres, or otherwise, to forbid all entrance to certain ports of the Empire, this is to give Notice that on approaching the shores of the United Kingdom, or any port of the British Empire, a sharp lookout should be kept for the signals described in the following paragraph, and for the vessels mentioned in paragraph (2), Part II., of this Notice, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) **If entrance to a port is prohibited, three *red* vertical lights by night, or three *red* vertical balls by day, will be exhibited in some conspicuous position, in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (2), Part II., of this Notice.**

If these signals are displayed, vessels must either proceed to the position marked "Examination Anchorage" on the Admiralty Charts and anchor there, or keep the sea.

EXAMINATION SERVICE.

(1) Under certain circumstances, it may become necessary to take special measures to examine vessels desiring to enter the ports or localities at home or abroad, referred to in Notice to Mariners No. 1 of 1912, and re-published on 1st January in every succeeding year as long as required.

(2) In such case, vessels carrying the distinguishing flags or lights mentioned in paragraph (4) will be charged with the duty of examining ships which desire to enter the ports and of allotting positions in which they shall anchor.

(3) As the institution of the Examination Service at any port will never be publicly advertised, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (4), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

(4) By day the distinguishing flags of the Examination Steamer will be a special flag (white and red horizontal surrounded by a blue border) and a blue ensign.

Also, three red vertical balls if the port is closed.

By night the steamer will carry: (*a*) Three *red* vertical lights if the port is closed; (*b*) three *white* vertical lights if the port is open.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(5) Masters are warned that, before attempting to enter any of these ports when the Examination Service is in force, they must in their own interests strictly obey all instructions as to entry given to them by the Examination Steamer. In the absence of any instructions from the Examination Steamer they must proceed to the position marked "Examination Anchorage" on the Admiralty Charts, and anchor there, or keep the sea.

(6) In case of fog, Masters of vessels are enjoined to use the utmost care, and the Examination Anchorage itself should be approached with caution.

(7) The pilots attached to the ports will be acquainted with the regulations to be followed.

(2616) Wt. 28947—625 (285). 35,000.—1/12. T.G.E.

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Gt. Brit. Hydrographic office.
Pilot guides.

THE

CHINA SEA DIRECTORY.

VOL. I.

CONTAINING

DIRECTIONS FOR THE APPROACHES TO THE CHINA SEA, BY MALACCA, SINGAPORE, SUNDA, BANKA, GASPAR, CARIMATA, RHIO, BERHALA, AND DURIAN STRAITS.

FIFTH EDITION.

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The China Sea Directory consists of three volumes; Volume I. treats of the islands and straits in the south-western approach to the China sea, as below mentioned; Volume II. of the China Sea and adjacent coasts as far northward as Hong Kong and Luzon; and Volume III. of the coast of China.

The China Sea Directory, Vol. I., contains sailing directions for the approaches to the China sea by Malacca, Singapore, Sunda, Banka, Gaspar, Carimata, Rhio, Berhala, and Durian straits; also general observations on the passages from and to the Cape of Good Hope, India, &c., to Malacca and Sunda straits, and to Singapore.

The material used is from the following sources:—Malacca strait from the surveys of Lieutenants Ward and Jackson, Indian Navy, 1852–60; the whole re-triangulated in 1894 by Commander A. M. Field, H.M. surveying vessel *Egeria*. Portions of it, viz., the Lankawi islands, Penang and its approaches, Dinding island and channel, Perak river entrance and its approaches, and Larut river, have been re-surveyed by Captain Napier, Commander the Honourable F. Vereker, and Lieutenant H. Belam, in H.M. surveying vessels, 1876–84.

Klang strait and its approaches were re-surveyed by Commander P. Vaughan Lewes, R.N., D.S.O., and officers of H.M.S. *Fearless* in 1903.

The whole of the western shore, from Acheh head nearly to the Karimon islands, the north and east coasts of Sumatra, is from surveys by the Netherlands Government.

Singapore, Banka, and Rhio straits are from the surveys of Messrs. Richards, Stanton, and Reed, Masters R.N., 1860–68, and Mr. Thompson, Government Surveyor, 1843–49; portions of Banka and Rhio strait have been re-surveyed by the Netherlands Government.

Durian strait is from the surveys of Lieutenants Collinson and Moresby, Indian Navy, 1822; Lieutenant Tjassens, Dutch Navy, 1843, with additions by Mr. Stanton, 1862.

The west coast of Sumatra, from Acheh head to Cape Felix (tanjong Raja), is from surveys and amendments by the Netherlands Government Surveying Officers; southward of that cape the information is chiefly from Messrs. Endicott and Gillis, 1833–34, and from Horsburgh; Simalur island and some isolated spots have been recently surveyed by the

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Netherlands Government. Information concerning this large extent of coast is still imperfect.

Sunda strait to Banka strait is chiefly from recent surveys by the Dutch.

Gaspar and Carimata straits are principally from the re-surveys made by the Dutch from 1880–85; the southern approaches to Carimata were partially examined by H.M.'s surveying vessels *Sylvia* and *Nassau*, 1874–76, and the Carimata islands, with some of the Montaren group, were surveyed by Lieutenant H. Hoskyn, H.M.S. *Flying Fish*, in 1880. The positions of some of the outlying reefs, however, have yet to be investigated.

Information for this work has also been gathered from Notices published by Colonial authorities, by the Netherlands India Government, and from the Remark books of H.M. vessels employed on the China station.

This volume was originally compiled by Staff Commander J. W. Reed, R.N., in 1867; a second edition was published in 1878; a third edition in 1886, and a fourth in 1896.

The present edition, which contains all available information to date, has been prepared for the press by Staff Commander J. R. H. MacFarlane, R.N.

As this volume embraces a large extent of coast, and many islands and dangers which are but imperfectly explored, it must be considered incomplete. Seamen, therefore, are invited to transmit to the Secretary of the Admiralty notice of any errors or omissions they may discover, or additional information they may obtain, with a view to the improvement of this work for the benefit of the mariner.

By the publication of this volume all former editions, as well as all Supplements, Hydrographic Notices and Notices to Mariners, relating to the area embraced by this book, up to and inclusive of No. 1139 of 1906, are cancelled.

A. M. F.

Hydrographic Office, Admiralty, London,
October 1906.

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GLOSSARY OF A FEW USEFUL TERMS IN THE MALAY, ACHINESE, AND SIAMESE LANGUAGES.

Malay.	English.	Malay.	English.
Ayer	Fresh water.	Laut, Laut besar	Sea.
—— masin	Salt water.	Layar	Sail.
Bagan	Fishing village.	Lumpur	Mud.
Batu	Rock, stone.	Malan, or Malang	A rock a little above high water.
Benting	Fort.		
Beri-beri	A disease, *see* p. 22.	Merah	Red.
Besar	Large, Great.	Nangka	Jack fruit.
Beting	Sandbank.	Padang	Plain, open space.
Bukit	Hill.	Panjang	Long, tall.
Burong	Bird.	Pinang	Betel nut.
Chemara	Casuarina tree.	Pisang	Banana.
Dapur	Cooking place.	Ponchak	Peak of a hill.
Gadong	House.	Proa	Native boat.
Gampier	The juice of a native plant.	Pulo	Island.
		Putih	White.
Gle	Hill, mountain.	Rantau	Reach of a river.
Goh	Island.	Salat	Strait, channel.
Gunong	Mountain.	Sampan	Native boat.
—— api	Volcano.	Sawa	Dry rice field.
Gusong	Shoal.	Seros	Fishing enclosures.
Itam	Black.	Sungi	River, stream.
Jalur	Native boat.	Tanah	Land, country, earth.
Jermals	Fishing enclosures.	Tanjong	Cape, point.
Kampong	Enclosure, village.	Tasik	Lake.
Kapal	Ship.	Telok	Bay, cove, creek.
Karang	Coral reef, rock.	Timbaga, tembaga	Copper.
Kedei	Town, large village.	Toko (Malay)	Store.
Kelapa	Cocoa-nut.	Trepang	Beche de mer (edible sea slug).
Kechil	Small.		
Krung	River.	Trumbu	A sunken rock.
Kwala, Kuala	Mouth of a river.	Trusan	Channel, passage.
Labuan	Anchorage, harbour.	Ujong	Cape, point, promontory.
Lampong	Buoy.		

PRINCIPAL POINTS OF THE COMPASS (MALAY).

Utara	North.	Salatan	South.
Utara-samata-timor.	N.N.E.	Salatan-daya	S.S.W.
		Barat-daya	S.W.
Timor-laut	N.E.	Barat-samata-salatan.	W.S.W.
Timor-samata-utara.	E.N.E.		
		Barat-tapat	West.
Timor	East.	Barat-samata-atara.	W.N.W.
Timor-tanggara	E.S.E.		
Tanggara	S.E.	Barat-laut	N.W
Salatan-tanggara	S.S.E.	Utara-barat-laut	N.N.W.

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SYSTEM OF ORTHOGRAPHY.

Adopted by the Admiralty for Sailing Directions and Charts.

As far as has been found possible with existing knowledge, native names are spelt in accordance with the following system, which has been adopted by the principal authorities in Great Britain and by the United States, and has been for some years in process of gradual introduction into all Admiralty Sailing Directions and Charts.

No change is made in the orthography of foreign names in countries which use Roman letters; thus French, Spanish, Portuguese, Dutch, &c. names will be spelt as by the respective nations.

1. Where native names have been so long written in a form which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained.

2. The true sound of the word as locally pronounced is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system which would attempt to represent the more delicate inflections of sound and accent would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English, *every letter being pronounced.* Two accents only are used :—

(1) The acute, to denote the syllable on which stress is laid. The use of this is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

(2) The sign ⌣ over the letter U to denote the short sound of that vowel under certain circumstances. (*See* table.)

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*.

The amplification of the rules is given on the following pages.

Information is invited as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system.

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Letters.	Pronunciation and Remarks.	Examples.
a	*ah*, *a* as in *father* - - - - - -	Java, Banána, Somáli, Bari.
e	*eh*, *e* as in *benefit*; *a* as in *fate* - - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English *e*; *i* as in *ravine*; the sound of *ee* in *beet*. Thus, not *Feejee*, but	Fiji, Hindi.
o	*o* as in *mote* - - - - - - - -	Tokyo.
u	long *u* as in *flute*; the sound of *oo* in *boot*. *oo* or *ou* should never be employed for this sound. Thus, not *Zooloo* or *Zoulou*, but	Zulu, Sumatra.
	The shorter sound of the different vowels, when necessary to be indicated, can be expressed by doubling the consonant that follows. The sounds referred to are as follows:— The short *a* as in *fatter*, as compared with the long *a* as in *father*. The short *e* as in *better*, as compared with the long *e* as in *fate*. The short *i* as in *sinner*, as compared with the long *i* as in *ravine*. The short *o* as in *sobbing*, as compared with the long *o* as in *sober*. The short *u* as in *rubber*, as compared with the long *u* as in *rubric*.	Yarra, Tanna, Mecca, Jidda, Bonny.*
ŭ	is the same short sound of *u* as is denoted by doubling the consonant following, but is used, and only used, where such doubling is impossible, as in case of words where *u* is followed by two different consonants, as in Tŭng, pronounced as the English *tongue*.	
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulúa, Oosima.
ai	English *i* as in *ice* - - - - - -	Shanghai.
au	*ow* as in *how*. Thus, not *Foochow*, but	Fuchau.
ao	is slightly different from *au* - - -	Macao.
aw	when followed by a consonant or at the end of a word, as in *law* - - - thus	Cawnpore.

* The *y* is retained as a terminal in this word under Rule 1. The word is given as a familiar example of the alteration in sound caused by the second consonant.

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Letters.	Pronunciation and Remarks.	Examples.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from *ey* in the English *they*, or *ei* in *eight*.	Beirút, Beilul.
b	English *b*.	
c	is always soft, but is so nearly the sound of *s* that it should be seldom used. If *Celébes* were not already recognised it would be written *Selébes*.	Celébes.
ch	is always soft, as in *church* - - -	Chingchin.
d	English *d*.	
f	English *f*. *Ph* should not be used for the sound of *f*. Thus, not *Haiphong*, but	Haifong, Nafa.
g	is always hard. (Soft *g* is given by *j*) -	Galápagos.
h	is always pronounced when used.	
hw	as in *what*; better rendered by *hw* than *wh*, or *h* followed by a vowel. Thus, *Hwang ho*, not *Whang ho* or *Hoang ho*.	Hwang ho, Ngan hwei.
j	English *j*. *Dj* should never be put for this sound.	Japan, Jinchuen.
k	English *k*. It should always be put for the hard *c*. Thus, not *Corea*, but	Korea.
kh	The Oriental guttural - - - - -	Khan.
gh	is another guttural, as in the Turkish -	Dagh, Ghazi.
l m n	As in English.	
ng	has two separate sounds, the one hard as in the English word *finger*, the other as in *singer*. As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in *loophole* - - - - - - -	Mokpho, Chemulpho.
th	stands both for its sound in *thing*, and as in *this*. The former is most common -	Bethlehem.

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Letters.	Pronunciation and Remarks.	Examples.
q	should never be employed; the sound of *qu* in *quiver* is given as *kw*. When *qu* has the sound of *k*, as in *quoit*, it should be given by *k*.	Kwangtung.
r	As in English.	
s	As in *sin*.	
sh t v w x	As in English.	Sawákin.
y	is always a consonant, as in *yard*, and therefore should never be used as a terminal, *i* or *e* being substituted.	Kikūyu.
	Thus, not *Mikindány* or *Wady*, but not *Kwaly*, but	Mikindáni, Wadi. Kwale.
z	English *z*	Zulu.
zh	French *j*, or as *s* in *treasure*	Muzhdaha.
.	Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an *acute* accent.	Tongatábu, Galápagos, Paláwan, Saráwak.

In the case of native names in countries under the dominion of other European powers, in whose maps, charts, &c., the spelling is given according to the system adopted by that power, such orthography is, as a rule, disregarded, and the names are spelt according to the British system. Thus the island east of Java in possession of the Dutch is spelt Madoera by them, but on Admiralty charts Madura. A town in Java appears on Dutch charts as Tjilatjap; in the British, Chilachap.

When a foreign language is written in a vocabulary of fixed sounds so as to permit of transliteration into the British system, a table of equivalents for each letter is drawn up, and names of places can be transliterated without regard to pronunciation.

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INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

THERE are three descriptions of publications as guides to navigation—the Charts, the Sailing Directions, and the Light Lists—which are all affected by the continual changes and alterations that take place.

Of these the charts should always be, so far as our knowledge permits, absolutely correct to date; and the Light Lists should be noted for the recent alterations, though space will not permit of full details being always inserted; the Sailing Directions, however, cannot, from their nature, be so corrected, and, *in all cases where they differ from charts, the charts must be taken as the guide.*

1. *Charts.*—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Office they are, as a rule, fresh from the plates. They then receive such corrections by hand in the depôts as are required, and are so issued to the ships.

The charts in the folios should have the same dates of correction as shown against each in the Lists pasted on the outside of the folio. The Navigating Officer is to satisfy himself that they do so agree before signing the receipt for the same.

All small, but important corrections, that can be made by hand, are notified by Notices to Mariners, and should at once be placed on the charts to which they refer.

Large corrections, that cannot be conveniently thus made, are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

The dates on which these large corrections are made are noted on the chart plates in the middle of the lower edge; those of the smaller corrections at the left-hand lower corners.

In all cases of quotations of charts, these dates of corrections should be given as well as the number of the chart (which will be found in

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the lower right-hand corner), in order that at the Admiralty it may be known what edition of the chart is referred to.

For convenience of office reference each chart has now two numbers, the ordinary number in the right-hand lower corner, and a number in brackets, thus: [429] in the left-hand lower corner, which is now called the New Number.

These new numbers are also given in the Catalogue of Admiralty Charts.

2. *The Light Lists*, annually published at the beginning of each year, are not corrected in the depôts before issue, but appendices are issued every two months, giving the alterations that have taken place, copies of which are put into the chart boxes.

It is the duty of the navigating officer, when he receives the set of charts, to make notations in the Light Lists from these appendices, and from the Notices to Mariners in the box; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions may be obsolete, in consequence of changes made since publication. The charts also may not be equally up to date in some details, for which no Notices to Mariners have been issued.

3. *The Sailing Directions* are not corrected before issue, except occasionally for very important new rocks or dangers. Hydrographic Notices and Supplements referring to each volume are published from time to time.

Supplements contain all the information received up to date since the publication of the volume to which they refer, and cancel all previous Hydrographic Notices.

Hydrographic Notices contain all information up to date since the publication of the volume, or since the last Supplement or Hydrographic Notice, but endeavour is made to issue no more than one of these affecting each volume, and, on the collection of fresh information, to include the former Notice in a Supplement.

The existence of Supplements or Hydrographic Notices is to be noted, in the tabulated form placed for the purpose inside the cover of each volume, in cases when such notations have not been made before issue, and also on receipt of further Notices after commission.

Notes should be made in the margin of the volume of sailing directions affected, as references to the Supplements or Hydrographic Notices when the latter are printed on both sides.

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To enable the books to be more conveniently corrected, however, such Supplements and Hydrographic Notices as are of moderate size are now being printed on one side only, and two copies are issued to each ship—one to cut up, the slips being pasted in at the appropriate place; the other to retain intact for reference.

To make these notations, or paste in these slips, is one of the early duties of a navigating officer after drawing his box of charts and books, and similar notes are to be made from Notices to Mariners that may thereafter be received.

It must, however, be thoroughly understood that sailing directions will never be correct in all details, except up to the date of the last Hydrographic Notice or Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

THE USE OF CHARTS AS NAVIGATIONAL AIDS, AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Accuracy of a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fulness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of Coast sheets, which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

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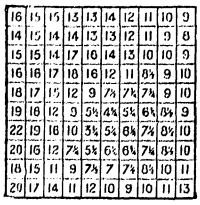
It must be borne in mind that the only method of ascertaining the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat, or vessel, obtaining the soundings, is kept on given lines; that each time the lead descends it only ascertains the depth of water over an area equal to the diameter of the lead, that is about two inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a width of two inches.

Surveys are not made on equal scales, but each survey is made on a scale commensurate with its apparent importance. For instance, a general survey of a coast which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, whilst surveys of areas where vessels are likely to anchor are made on a scale of three inches to the mile, and surveys of frequented ports, or harbours likely to be used by Fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large Coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, *i.e.*, of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper:—



Little assistance in detecting excrescences on the bottom is afforded by the eye, even in clear water, on account of the observer being within five feet of the surface; none in turbid seas. If there is no inequality in the soundings to cause suspicion, a patch between two lines may occasionally escape detection.

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Lines of soundings plotted as close as may be practicable on a scale of 6 inches to the mile would be 100 feet apart, and each line would be only 2 inches in actual width.

Thus, in a chart on a scale of one inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape the lead; whilst in a chart on a scale of 6 inches, inequalities as large as battleships, if lying parallel to, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General Coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the contour line of 10 fathoms, without taking every precaution to avoid a possible danger; and even with surveys of harbours on a scale of 6 inches to the mile, vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead will not rest on them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear unless it is shown to be foul, the contrary should be assumed.**

2. *Fathom Lines a Caution.*—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, as before mentioned, another warning, especially for ships of heavy draught.

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Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. *Chart on largest scale always to be used.*—It sometimes happens that, from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coast-line or soundings. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

4. *Caution in using Small Scale Charts.*—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. *Distortion of Printed Charts.*—The paper on which charts are printed has to be damped. On drying, distortion takes place from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

6. *Buoys.*—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

Gas Buoys.—The lights shown by gas buoys cannot be implicitly relied on, as, if occulting, the apparatus may get out of order, or the light may be altogether extinguished.

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7. *Lights.* — Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation, or visibility, or obscuration of the light occurs.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height, at the end of each Light List, affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles, if of any power. (*See* table in Light List before mentioned.)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

8. *Fog Signals.*—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the fog signal station, in some instances even when in close proximity to it. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a station until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be made. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck. Under certain conditions of the atmosphere, when a fog signal is a combination of high and low notes, one of the notes may be inaudible.

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The mariner should not assume—

a. That he is out of hearing distance, because he fails to hear the sound.

b. That because he hears a fog signal faintly, that he is at a great distance from it.

c. That he is near it, because he hears the sound plainly.

d. That the distance from and the intensity of the sound on any one occasion, is a guide to him for any future occasion.

e. That the fog signal has ceased sounding, because he does not hear it even when in close proximity.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

9. *Tides and Tidal Streams.*—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be remembered that there are indraughts to all bays and bights, although the general run of the stream may be parallel to the shore.

The turn of the tidal stream off shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by about three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, the table (B) at page 146 of the Tide Tables will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low water ordinary springs. This always occurs on the coasts of Europe at the equinoxes, but in other parts of the world, and especially in the tropics, such periodic low tides may coincide more frequently with the solstices. Wind or a high barometer may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

10. *Arrows* on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

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11. *Fixing Position.*—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are now being supplied with a station-pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment. First, that the objects be well chosen; and, second, that the observer is skilful and rapid in his use of the sextant.

For the former, reference can be had to the pamphlet on the use of the station-pointer, which is in every chart box; the latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or rifle fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart, as fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow, and on the beam, the distance from the object at the latter position being the distance run between the times of

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taking the two bearings, allowing for current, gives an excellent fix for a departure, but does not ensure safety, as the point, and probably the rocks off it, are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to the distance run in the interval, allowing for current.

A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is now supplied in all chart boxes.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude and longitude by chronometer) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line provided the chronometer is correct. A deep cast of the lead at the same time may often serve to get an approximate position on the line. An early and very accurate position can be also obtained by Sumner's method, by getting a longitude by a bright star at daylight when the horizon is well visible, and another longitude by the sun when a few degrees above the horizon, or by observing two or more stars at twilight. The Sumner lines drawn through the two positions thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

12. *Change of Variation of the Compass.*—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are

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long, the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations too often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles. The variation chart should be consulted on this head.

13. *Local Magnetic Disturbance of the Compass on board Ship.*— The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

14. *Use of Oil for Modifying the Effect of Breaking Waves.*— Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain; as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing

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else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

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IN THIS WORK THE BEARINGS ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE VARIATION GIVEN IN THE MARGINS OF THE SEVERAL PAGES ARE FOR THE YEAR 1905.

THE LATITUDES AND LONGITUDES GIVEN IN THE MARGINS ARE APPROXIMATE.

THE BEARINGS OF THE LIMITS OF VISIBILITY OF ARCS OF LIGHTS ARE FROM SEAWARD OR TOWARDS THE LIGHT.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100 FATHOMS.

THE SOUNDINGS ARE REDUCED TO LOW WATER OF ORDINARY SPRING TIDES.

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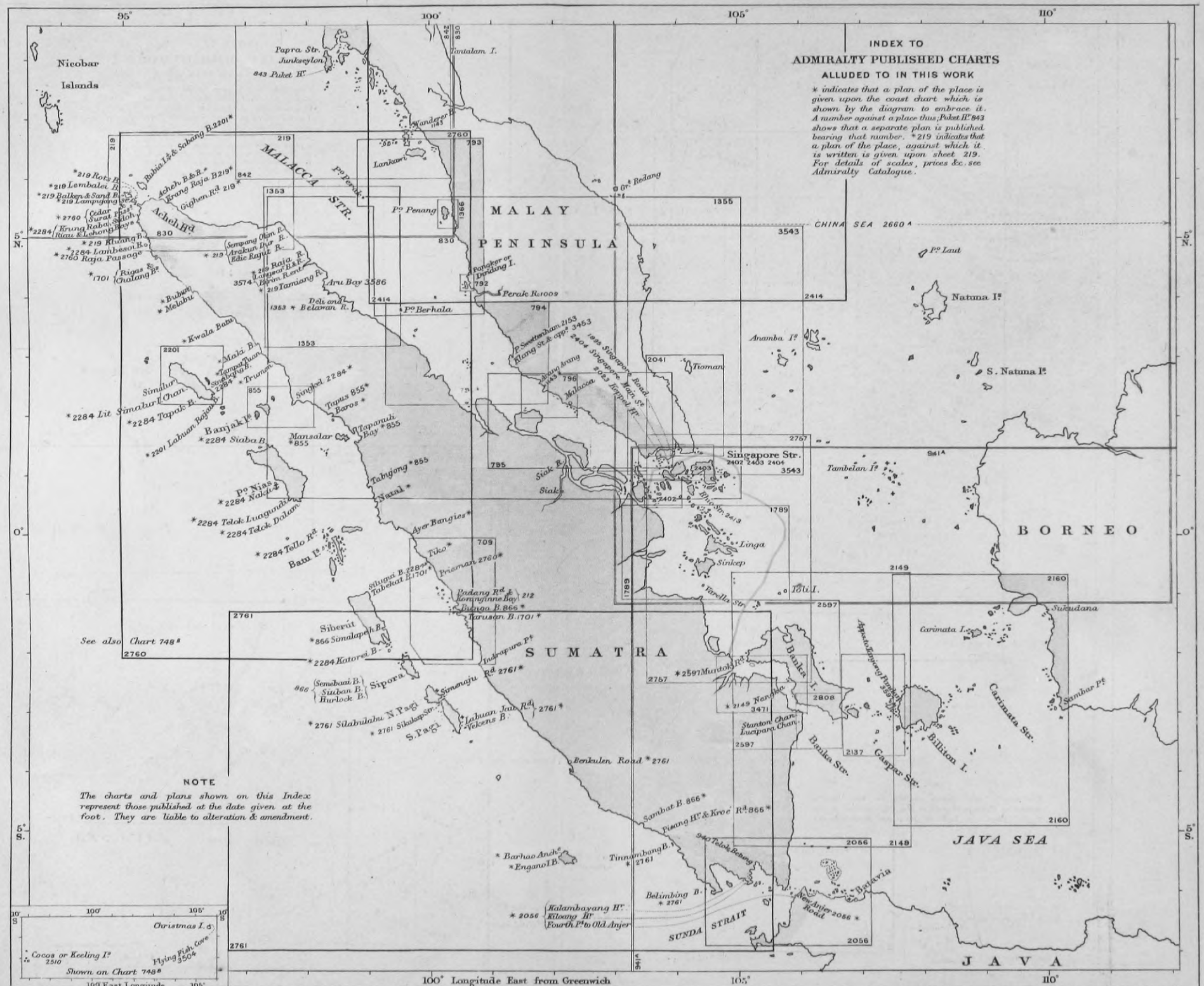

Corrected to September 1906.

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For details of sectors and the latest information respecting the Lights which are included in this work, seamen should consult the Admiralty List of Lights, Part VI. This List is published early in every year, corrected to the preceding 31st December.

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THE

CHINA SEA DIRECTORY,

VOL. I.

CHAPTER I.

GENERAL REMARKS—STRAITS SETTLEMENTS—SINGAPORE—MALACCA — PENANG — PROVINCE WELLESLEY — THE DINDINGS—COCOS OR KEELING ISLANDS—CHRISTMAS ISLAND — FEDERATED MALAY STATES — PERAK — SELÁNGOR—NEGRI SEMBILAN—JOHOR—NETHERLANDS INDIA, SUMATRA—TRADE—COMMUNICATION—CLIMATE —WINDS AND WEATHER—RAINFALL—CURRENTS—TIDES—BUOYAGE—COAL — DOCK ACCOMMODATION — PILOTS—PASSAGES.

The China Sea Directory, Vol. I., contains a description of Sumatra and its off-lying islands, Cocos or Keeling and Christmas islands, also of Malacca, Singapore, and Sunda straits and the various passages leading from the Indian ocean to Singapore and northward to the China Sea. For Java, &c., *see* Eastern Archipelago, Part II.

STRAITS SETTLEMENTS.—The Straits Settlements (the name given to the British possessions in the Malay peninsula) comprise Singapore island, Malacca town and province, Penang island, Province Wellesley, the Dindings islands, the Cocos or Keeling islands, and Christmas island; they have an area of 1,526 square miles. Chart, 748*b* [2,364].

The Straits Settlements became a Crown colony on the 1st April 1867, and the Government consists of a Governor with an Executive and Legislative Council.

Population.—In 1901 the total population of the colony was 572,249, consisting of 5,058 Europeans and Americans (including 495 British military); 7,663 Eurasians; 281,933 Chinese; 215,058 Malays and other natives of the Archipelago; 57,150 Tamils and other natives of India, and 5,378 other nationalities.

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Chart, 7485 [2,364].

Trade.—The principal articles of export are gambier, gutta-percha, coffee, hides, rattans, sago flour, pepper, tin, tapioca, copra, nutmegs, canes, gum Benjamin, gum copal, gum dammar, gamboge, sticklak, mother of pearl shells; in the year 1904 these were valued at $255,439,000.

The chief imports, consisting of cotton goods, specie, provisions, coal, rice, hardware, and cutlery, coloured and plain handkerchiefs, paper, malt liquor, spirits, tobacco, wheat, flour, petroleum, &c., in the same year amounted to $325,868,000.

In 1901 the total number of vessels which entered the ports of the Straits Settlements was 26,089, with an aggregate tonnage of 9,676,477.

Ports.—The principal ports are Singapore, Penang and Malacca.

Money. — The currency of the colony consists of British and Mexican dollars circulated at equal value, with the following silver and copper coins representing fractional parts of a dollar :—

Silver 50, 20, 10 and 5 cents pieces.

Copper 1, $\frac{1}{2}$, and $\frac{1}{4}$ cent pieces.

Government currency notes were issued in 1899.

Uniform time.—The colony of the Straits Settlements and the Federated States in the Malay Peninsula have adopted the mean time of the 105th meridian, or 7 hours east of Greenwich mean time.

Climate.—The climate of the colony, situated in the neighbourhood of the equator, and exposed to the sea, is both hot and moist. The damp heat is distinctly enervating to European constitutions, and care must be exercised by those who would enjoy good health. The mean rainfall in 1904 amounted to 101·5 inches at Singapore; 119·5 inches at Penang; 98·9 inches at province Wellesley; 72·23 inches at Malacca, and 92·83 at the Dindings.

The Federated Malay States, situated on the mainland of the Malay peninsula, are closely connected with the Straits Settlements, and comprise an area of about 27,000 square miles. The states are Perak, Selángor, Negri Sembilan, and Pahang.

The anarchy prevailing in almost all the Native States of the Malay peninsula, and especially in Perak, was prior to 1874 a source of disquiet to the Straits Settlements and a hindrance to the growth of local trade, and in that year British Residents were appointed to advise the native rulers and perform certain executive duties.

In 1895 the states of Sungi Ujong, Sri Menanti, Johol, Jelebu, Rembau and Tampin were confederated under the name of The Negri Sembilan, with one British Resident, and in 1896 an agreement was entered into for the federation of the states of Perak, Selángor, Pahang, and Negri Sembilan under a British Officer styled the Resident-General.

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SINGAPORE (native Singapura), an island about 27 miles in length by 14 miles in breadth, containing an area of 206 square miles, is situated at the southern extreme of the Malay peninsula, from which it is separated by a strait about three-quarters of a mile in breadth. There are a number of small islands adjacent to it which form part of the settlement. The island, first occupied in 1819, was for many years administered by officials from India, and became a Crown colony in 1867. Owing to its geographical position and well sheltered anchorage, it possesses a trade and importance out of all proportion to its area and productions.

Chart, 2,403 [2,525]. Lat. 1° 16′ N. to 1° 28¼′ N. Long. 103° 38′ E. to 104° 01′.

The surface of the island is undulating and diversified by hills ranging from 70 to rather less than 400 feet; Bukit Timah, the greatest elevation, being 576 feet above high water.

Lat. 1° 21′ N. Long. 103° 46′ E.

Geology. — The core of the island consists of crystalline rocks, but in the west there are shales, conglomerates, and sandstones, and all round the island the valleys are filled with alluvial deposits, on a much more extensive scale than might be expected, considering that none of the streams have a course of more than 6 miles, nor attain to any size except after heavy rains. Being chiefly composed of red clays and laterite, the soil is not generally rich.

Flora and fauna. — When first occupied by the British the whole island was covered with forest and jungle; now, in remote parts, waste places are covered with coarse grass. Palms, ferns and orchids grow luxuriantly, and Liberian coffee, pine-apples, cocoa-nuts, and aloes are most important objects of cultivation. Almost all kinds of fruits do well; the names of the principal indigenous fruit being:—Blimbing, blimbing buloh, blimbing sago, custard-apple, durian, durian blanda, duku, langsat, lime, mangosteen, orange, plantain, polesan, pine-apple, rambootan, tarrap, and tampang.

There is a Botanic garden devoted to the introduction of economic plants, such as China and Assam tea and Salt bush or *Rhagodia*, which supplies excellent fodder.

Elephants, panthers, tapirs, deer, wild hogs, sloths, monkeys and squirrels are the most noteworthy mammals, and tigers still find their way across the strait from the mainland.

Population.—In 1901 the population was 228,555, of which 3,824 were Europeans and Americans, including 495 British military; Eurasians, 4,120; Chinese, 164,041; Malays, 38,080; Indians, 17,823; and other nationalities, 2,667.

Trade.—Singapore is a free port, and no duties are levied upon any articles except opium, spirits, wines and beer consumed in the colony. For the nature of exports and imports, *see* Straits Settlements.

In 1904 the exports and imports (including treasure) amounted respectively to $243,556,190 and $274,674,803; the tin exported being

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Chart, 2,403 [2,625].

valued at $41,795,671. During the same year the port was entered by 5,590 vessels, with an aggregate tonnage of 6,636,670 tons, 180 being vessels of war. About 550,000 tons of coal are imported annually.

Lat. 1° 17½′ N. Long. 103° 51½′ E.

Ports.—Singapore is the principal port.

Communication.—Steamships.—The following are the principal steamship companies affording communication:—Peninsular and Oriental Steam Navigation Company:—Fortnightly to Penang, Colombo, Calcutta, Bombay, Aden, Port Said, Suez, Brindisi, Malta, Marseilles, Gibraltar, Plymouth, and London; also to Hong Kong, Shanghai, Nagasaki, Kobe, and Yokohama.

Messageries Maritimes de France:—To Colombo, Bombay, Aden, Suez, and Port Said; also to Saïgon, Hong Kong, Shanghai, Nagasaki, Kobe, and Yokohama, every 28 days.

To Batavia, every fortnight, connecting with every mail.

To Saïgon, every fortnight, connecting with the outward English mail.

Imperial German Mail Line:—To Penang, Colombo, Aden, Suez, Port Said, Naples, Genoa, Gibraltar, Southampton, Rotterdam, Antwerp, and Bremen; also to Hong Kong, Shanghai, Nagasaki, Kobe, Yokohama, every fortnight.

British India Steam Navigation Company:—To Penang, Rangoon, and Calcutta, weekly; to Madras and Coromandel coast ports, fortnightly; to Manila and Japanese ports, every six weeks, and to Europe, *viâ* India, every fortnight.

Glen Line:—To London every three weeks.

East Asiatic Company:—A regular service of steamers every 10 days to Bangkok; also to Shanghai, Port Arthur, Hankow, Newchwang, and Dalny.

Letters from England reach Singapore in 24 days.

Railway.—A railway from Singapore runs for a distance of about 14 miles, across the island to Woodlands opposite Johor, from which a steam ferry crosses the Old Strait or Salat Tebrau. The railway is in course of extension to the Colonial Government wharves.

Chart, 1,188 [3,513].

Telegraph.—Two submarine telegraph cables are laid to Penang, and single cables to Malacca, to Saïgon, to Labuan, to Landangan and to Batavia. In 1901 there were 700 miles of telephone wires.

Roads.—In 1901, there were 192 miles of roads about equally maintained by the Government and by the municipality.

Fisheries.—The local names of the principal fish are:—Bawal, Blanak, Chencharu, Gelama, Ikan duri, Ikan merah, Ikan pari, Kurau, Lida lida, Parang parang, Siakap, Tenggiri, Yu laras, and Yu Parang; in 1901 the value of the Singapore fisheries was estimated to be $2,352,000.

Climate.—The climate is fairly healthy for Europeans, except for the absence of any marked change of temperature throughout the year,

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the thermometer usually ranging from 73° to 90° Fahr., and there are no diseases or ailments, due to climatic causes, against which special precautions are necessary. The monsoons are little felt on the island, but frequent showers keep it in a perpetual state of verdure.

MALACCA.—Situated on the western coast of the Malay peninsula, between Singapore and Penang and about 110 miles north-west of Singapore, Malacca consists of a strip of territory about 42 miles in length and from 8 to 25 miles in breadth, with an area of 659 square miles.

Chart, 1,355 [2,513].
Lat. 2° 23′ N. to 2° 3′ N.
Long. 101° 58′ E. to 102° 34′ E.

It is one of the oldest European settlements in the East, having been taken possession of by the Portuguese in 1511 and held by them till 1640, when the Dutch drove them out. In 1795 it was captured by the British and retained by them till 1818, when it was restored to the Dutch; in 1824 it was exchanged for the British Settlements in Sumatra and became a British possession.

Flora and fauna.—In the vast forests of the Malay peninsula the accumulation of the decay of vegetable matter, during countless ages, has enriched the soil to the depths of many feet, and from it spring huge trees, shrubs, bushes, tangle, ferns, mosses and parasitic growths. Good hard-wood timber is obtained, the best kinds being *mĕrabau*, *pĕnak*, *rasok*, and *chengal*. Orchids of countless varieties abound. The principal fruit trees are the durian, the mangosteen, the custard-apple, the pomegranate, the jack fruit, the cocoa-nut, the areca nut, the sugar palm and the banana. Agila wood, camphor tree and ebony are found in small quantities.

The fauna is varied and profuse, consisting of the Asiatic elephant, the *sĕlădang*, a large bison, two varieties of the rhinoceros, the honey bear, the sambhur, the speckled deer, the mouse deer, the gibbon, at least twenty kinds of monkeys, the lemur, the Asiatic tiger, the black panther, the leopard, the large wild cat, several jungle cats, the wild boar, the wild dog, the flying squirrel, the flying fox, the python, the cobra and various snakes, also the alligator and the otter. Amongst the birds are the argus pheasant, the blue partridge, the adjutant bird, and several kinds of herons, cranes, ducks, teal, snipe, wood and other pigeons.

The forests swarm with insects, and the scorpion and centipede are both common.

Population.—In 1901 the population was 95,487.

Products.—Tapioca plantations of large extent are very remunerative. Cocoa-nuts are largely grown along the coast, the soil is very suitable for rubber, and plantations of *Hevea braziliensis* and *Ficus elastica* are increasing in extent. There are some tin mines of small extent worked by Chinese.

Trade.— In 1904 the exports amounted in value to $3,357,474 and imports to $4,087,019; during the same year 1,882 vessels, of 387,705 aggregate tonnage, entered the port, exclusive of native craft.

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Chart, 1,355 [2,513]. Lat. 2° 11½′ N. Long. 102° 12¼ E.

Ports.—Malacca is the principal port.

Communication.—Steamships.—Frequent steamship communication by the Straits Steamship Company and by other steamers with Singapore, Arang Arang and port Swettenham.

Chart, 1,188 [3,513].

Telegraph.—Submarine cables to Penang and Singapore, and a land wire to port Swettenham.

Roads.—There were 279 miles of roads in Malacca in 1904, and two-thirds of this mileage is good for cycling.

Climate.—The maximum temperature registered in 1904 was 89·5°, and minimum 70·5°, the mean being 79·2°; in the same year the maximum rainfall was 100·32 inches, and mean rainfall 72·23.

Chart, 1,355 [2,513]. Lat. 5° 14½′ N. to 5° 28′ N. Long. 100° 10½ 'E. to 100° 21′ E.

PENANG, an island about 14 miles in length and from 6 to 9 miles in breadth, containing an area of 108 square miles, is the northernmost of the settlements and situated off the west coast of the Malay peninsula, near the northern entrance to Malacca strait. It was founded in 1786 and officially known as Prince of Wales island, a sum of $10,000 being paid annually to the British; in 1805 it was made a separate Presidency under the East India Company; in 1826 it was incorporated under one government with Singapore and Malacca; and in 1829 it was reduced from the rank of a Presidency.

The north part of pulo Penang is mountainous, and through the centre of the island runs a range of hills, declining in height as it approaches the south-west extremity; but two-thirds of the whole surface of Penang is level and of gentle inclination, and, like the hills, is well-wooded. West hill, the highest point of the island, is 2,735 feet high, and at a short distance to the eastward is Government hill, on which stands a signal flagstaff, 2,551 feet above high water. The western side of the island is low and wooded.

Lat. 5° 7½′ N. to 5° 34′ N. Long. 100° 20¼′ E. to 100° 24¾′ E.

Province Wellesley.—On the shore of the mainland, from which Penang is separated by a strait, 1½ miles wide, is Province Wellesley, a strip of territory forming part of the settlement; it averages 8 miles in breadth and extends about 35 miles in a north and south direction, including 10 miles of territory southward of Krian river, the whole containing an area of 270 square miles.

Capital.—The chief town is Georgetown on Penang island.

Population.—In 1901 the population of Penang was 128,832, and of Province Wellesley 115,264.

Products.—The soil is favourable to the growth of spices; the chief articles of cultivation are sugar, rice and cocoa-nuts, and the island produces fine timber, which is well adapted for spars and ship building; also various fruits. Province Wellesley is in a high state of cultivation when compared with the neighbouring territories; the chief articles cultivated are sugar, tapioca, paddy and cocoa-nuts.

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Trade.—The exports comprise tin, sugar, spices, sago, rice, buffalo hides and horns, rattans, gum, coffee and opium. Chart, 1,355 [2,513].

In 1904 the exports, inclusive of treasure, were valued at $79,280,187, and imports at $105,180,266. In the same year export of tin amounted in value to nearly $80,000,000, and the port was entered by 2,529 vessels with an aggregate tonnage of 2,618,842 tons, 16 being vessels of war.

Communications. — Steamships. — Most of the large companies' steamers touch at Penang. *See* Communications, Singapore, page 4. There is daily communication with port Weld ; once every four days with Padang, Langkat, Perak ; weekly with Singapore, Hong Kong, Swatow, Amoy, Klang, and Malacca ; and frequently with Acheh and Deli. Fortnightly by steamers to pulo Weh and the west coast of Sumatra.

Railways. — The province Wellesley section of the Federated Malay States Railway connects Prai, in port Wellesley, with the Perak railway system. (*See* page 14.)

Telegraphs.—There are two submarine cables to Singapore, and single cables to Madras, to pulo Weh, to Malacca, and to Deli. Land wires to Durian and Lakon, thence to Bangkok. Chart, 1,188 [3,513].

Climate. — The climate of the high lands of Penang is said to resemble that of Funchal in Madeira ; the thermometer in the plains ranges between 73° and 94°, and on the mountains from about 65° to 75°. The rainy season is from May to November, but rain falls throughout the year. The annual rainfall on the plains rarely exceeds 65 inches, but on the hills it is generally above 100 inches. (*See* page 31.)

Excepting in a few places, Penang is considered to be very healthy. It is not subject to epidemics ; cholera is unknown ; dysentery is infrequent ; but in some of the low-lying places ague prevails. Lepers are numerous, and there is a depôt at pulo Jerajak for them.

Fisheries. — In 1901 the value of the Penang fisheries was estimated at $1,115,000.

The Dindings, a group of islands, 80 miles to the southward of Penang, contain an area of 270 square miles, two-thirds of which is forest : they include pulo Pangkor, the largest island, and a strip of territory on the mainland, about 70 miles from Georgetown and about 22 miles long by 11 miles broad. They are included in the Settlements, for administrative purposes, under the Resident Councillor. Lat. 4° 11½′ N. to 4° 16′ N. Long. 100° 31½′ E. to 100° 34½′ E.

Flora and fauna. — Animal and vegetable life abound, but the density of the jungle renders animals difficult of approach ; the durian, the pine-apple, the mango, and the pomegranate are grown.

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Chart, 1,355 [2,513].

Great Dinding is known to contain tigers, hogs, deer, monkeys, alligators, venomous snakes, &c. ; pigeons and other birds abound.

Population.—In 1901 the population was 4,113.

Products.—The only product of any value is timber.

Climate. — The climate of the islands has been found to be extremely unhealthy, on account of the prevalence of malarial fever, and in consequence the head quarters of the Administration were removed, in 1889, from the island to Lumuh, on the south bank of the Dinding river, about 2½ miles from its entrance.

Chart, 2,510 [2,542]. Lat. 11° 49′ S. to 12° 12½′ S. Long. 96° 49′ E. to 96° 56′ E.

COCOS or KEELING ISLANDS, a small group, about 20 in number, of coraline formation, lie in the Indian Ocean, south-westward of Sumatra; the largest island is 5 miles in length and about a quarter of a mile in breadth.

Discovered by Captain William Keeling, of the East India Company in 1608, they were little known until visited by Captain J. Clunies Ross, of the ship *Borneo*, who partially refitted his ship there in 1825.

Captain Ross returned to the islands in 1827 with some Scotch colonists, but found them occupied by Alexander Hare, who, with a large number of Malay followers, had arrived the same year. The two factions lived on bad terms with each other, and many of Ross' colonists left the place owing to its being already occupied, but eventually Ross' influence became the stronger, and Hare, deserted by his followers, left the islands, which are now owned by the Ross family.

They were taken possession of by the British Government in 1857, were placed under the Government of Ceylon in 1878, and in February 1886 were transferred to the Government of the Straits Settlements, being officially visited yearly.

Flora and Fauna. — There are a variety of cocoa-nut palms, two of which are supposed to be a distinct kind ; some magnificent specimens of *Ficus elastica* produce rubber, and Bintang Laut trees are planted all round the islands to break the force of cyclonic winds, which destroy the cocoa-nut plantations. The air plant is found in these plantations. All the fruits common to the Malay Archipelago are grown, with the exception of durians and mangosteens.

Rats are numerous and destructive; centipedes, scorpions, copra bugs, white ants and flies (*Cantharides*) are common, and there are a few moths and butterflies.

Frigate birds, boobies and gannets abound; the Java sparrow is not uncommon, and a few pigeons and ground thrushes have been imported from Christmas island. The white tern (*Gygis candida*) and the sooty tern breed here.

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The fishes comprise grey and red mullet, flying fish, snappers and a species of rock perch.

Chart, 2,510 [2,542]. Lat. 11° 49′ S. to 12° 12½′ S. Long. 96° 49′ E. to 96° 56′ E.

Population.—In 1903 the total population of the islands was 639, consisting of 1 European, 567 Cocos islanders, and 71 Bantamese, which did not include the Eastern Telegraph community, numbering 31, who live on Direction island.

Products.—The products are copra, cocoa-nuts, bêche-de-mer and mengkudu.

Trade.—Copra is the only article exported, of which about 500 tons were shipped to Europe in 1903, but owing to a severe cyclone in 1902 this only represented about two-thirds of the average production, which is about 15 tons per week. The imports are provisions of all kinds, clothes, cutlery, guns, and most other necessaries of life. The natives are excellent boat-builders.

Communication.—There is a submarine telegraph cable to Rodriguez and Mauritius, thence to Zanzibar, *viâ* Seychelles, and to port Natal *viâ* Reunion; also a cable to Perth, Western Australia.

Chart, 1,188 [3,513].

Money.—A paper currency is in circulation, consisting of sheep's skin notes, equal to five-sixths of a Dutch guilder, the value of which latter is about one shilling and sixpence.

Climate.—The climate is exceedingly healthy during the greater portion of the year, more especially during the months of May to September, when it is said to resemble the climate of Southern Europe in the summer months.

Previous to the introduction of beri-beri, a disease which in 1902 was prevalent amongst the Chinese workmen employed by the Telegraph Company, sickness was rarely known, but during the dry season, September to November, cases of it occur, and diarrhœa is prevalent; and in a less degree in the months of March to May.

An epidemic of influenza was experienced in 1894, causing several deaths.

June to September, when the trade wind is strongest, is the coolest season, the temperature then varying from 78° to 80°, occasionally reaching 82° Fahr.; the night temperature being 73° or 74° Fahr.

The hottest months are from December to March, when the trade wind is less regular, the temperature then ranging from 83° to 85°, and occasionally reaching 88° to 89° Fahr., the night temperature being 76° or 77° Fahr.

The close, hot nights, usually experienced in the tropics, are few.

During the strong trade wind the air is pleasantly dry, there being from 6° to 8° difference between the wet and dry bulbs, and even in the opposite season there is usually a difference of 2° to 3°.

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Chart, 2,510 [2,542].

The average height of the barometer is 29·90 inches, varying one-tenth on either side, but, during storms, or passing cyclones, it may fall an inch or more.

The rainfall is said to exceed 80 inches, occurring as passing showers between the months of April and September, and mostly at night, but between November and April it is heavier, more frequent, and affords a lasting supply to the wells.

Chart, 941*a* [2,555]. Lat. 10° 25′ S. Long. 105° 42′ E.

CHRISTMAS ISLAND, about 12 miles in length, 9 miles in breadth at its widest part, and with a total area of approximately 43 square miles, lies about 190 miles south of Java, which is the nearest land.

First mentioned, by the name of Moni, in a map published in Holland, 1666, it was visited by Dampier in 1688, and in 1886 an examination of the island was made by Captain Maclear, H.M. surveying ship *Flying Fish.* The island was annexed by H.M.S. *Impérieuse* in June 1888, and placed under the Straits Settlements Government, with a district officer stationed on the island. It is rented to the Christmas Island Phosphate Company on a 99 years' lease.

It consists of a central plateau, highest towards the north and east, and descending to the sea on all sides by a succession of terraces, separated by slopes or cliffs. Nearly the whole of the coast line is formed by limestone cliffs, varying in height from about 15 to 150 feet.

On the north is Maclear Deep, in which a depth of 3,200 fathoms was found, and to the south and south-west is the more extensive Wharton Deep, with upwards of 3,000 fathoms; the island forms the summit of a submarine peak, the base of which rises from the low saddle which separates these two abysses.

Geology.—The island is probably an ancient atoll, which has been raised to a considerable height above the level of the sea, and on the summits and flanks of which great accumulations of Tertiary limestones have been deposited, in some cases inter-stratified with the products of the eruptions, probably for the most part submarine, which took place from time to time. The oldest of the volcanic rocks are trachytic, the newest basaltic. The last of the eruptions was accompanied by the formation of thick beds of volcanic ash, and upon these the great mass of Miocene limestones rest; the later deposits, which have accumulated on the basis thus constituted, are very difficult to describe.

Perhaps the most remarkable of the rocks are the thick deposits of nearly pure phosphate of lime which cap several of the higher hills; on Murray hill there is a bed of rock, consisting largely of phosphates of alumina and iron.

Flora and fauna.—Luxuriant forests of large trees, from 150 to 200 feet in height, cover parts of the upper terraces of the island, in

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Chart, 941*a* [2,555].
Lat. 10° 25′ S.
Long. 105° 42′ E.

some places with a thick undergrowth of *Pandanus, Randia*, ferns, &c., but, as a rule, the forest is fairly open. The chief plants introduced include cocoa-nut palms, date palms, bamboos, sugar cane, bananas, pine-apples, pomegranates, papaia, nutmegs, cacao, coffee plants, chillies, custard apples, pumpkins, gourds, maize, and tobacco. The soil is a rich brown loam.

The mammals, few and small, include two species of rats, *Mus macleari*, large and exceedingly destructive, and *Mus nativitatis*, a large brown and black and comparatively harmless animal; a large fruit bat, a shrew, and an insectivorous bat.

Fruit pigeons (*Carpophaga whartoni*) are numerous, and ground pigeons are found. There are two species of Frigate birds; three of the booby; a yellow and a white Tropic bird; a goshawk, an owl, and a ground thrush, which latter is common everywhere in the island. A large hermit crab (*Cancer clypeatus*) is found in considerable numbers; they are good climbers and get into small trees and bushes in search of food. Turtles are often seen round the coasts and deposit their eggs in the coral sand of the beaches.

Population.—In 1904 the population was about 1,000, of which 12 were Europeans.

Trade.—Phosphate to the amount of about 75,000 tons is exported annually. Hard wood is sent to the Cocos islands for boat-building purposes.

Communication.—The Christmas island Phosphate Company's steamer makes regular passages between Singapore and the island.

Climate.—The climate is both pleasant and healthy during the greater part of the year, resembling a hot, dry, English summer, and tempered nearly always by a steady sea-breeze from E.S.E., which is generally fairly cool, and keeps the day and night temperature very even.

Observations taken from 1901 to 1903 give the highest recorded temperature as 94·1° Fahr. in January 1903, the thermometer showing above 90° Fahr. on each of the eight consecutive months from October to May. The lowest temperature registered was 66·9° in September 1902, the thermometer falling below 70° only in August and September.

The mean annual temperature was 80·8° Fahr., the maximum mean being 82·3° in April and the minimum 78·4° in August.

Complete saturation of the atmosphere was extremely rare, and less than 1° difference between the dry and wet bulbs seldom occurred; the mean relative humidity was 80°.

The mean annual barometric pressure was 29·914 inches, rising to a maximum of 29·986 inches in September, and falling to a minimum of 29·825 inches in March.

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Chart, 941*a* [2,555].

Sheltered from the excessive rainfall of the East Indian Archipelago, brought by the easterly trades, the annual rainfall on the island amounted to 71·81 inches, the maximum occurring in March, when the monthly mean was 14·48 inches; a secondary maximum occurred in July, and was 11·45 inches. The greatest fall on any one day was 4·11 inches in March. The minimum rainfall, recorded in September and October, was about half an inch for each month. Thunder and lightning were of comparatively rare occurrence.

Except for showers at night on the higher parts of the island, the rainfall occurs from December to March inclusive, sometimes in heavy downpours lasting several days, but as a rule the mornings are fine; at this season the E.S.E. trade wind occasionally shifts to the north and N.E., and the rain nearly always comes with the shift of wind. There is a secondary fall in July.

In the dry season (May to December) the vegetation is kept fresh by very heavy dews and occasional showers at night.

There are some cases of beri-beri.

Chart, 1,355 [2,513]. Lat. 5° 7½′ N. to 4° 32′ N. Long. 100° 24¾′ E. to 100° 37½′ N.

FEDERATED MALAY STATES.—PERAK (pronounced Perah), the most northerly of the protected states on the West Coast of the Malay peninsula, is bounded on the north by Province Wellesley and the Malay state of Kedah; on the south by Selángor; on the east by Pahang and the independent states of Kelantan and Petani; and on the west by the Straits of Malacca. It has a coast line of about 90 miles; the area is estimated at about 6,550 square miles, and the greatest length of the state, in a north and south direction, is 172 miles, and the breadth, in an east and west direction, 100 miles.

The early history of Perak is obscure. The first European settlement was made by the Dutch in 1650, but the country rising against them it was abandoned in 1783, and it was taken by the British in 1795.

Mountains.—Two mountain ranges, running from north-east to south-west, are thickly covered with jungle and attain a height of 8,000 feet above high water, near the eastern boundary of the state; the valley of the Perak and Kinta rivers lies between these ranges.

Rivers.—The state is well watered by numerous rivers and streams, of which the river Perak is the most important; it runs nearly north and south, then turns sharply to the westward and falls into the straits of Malacca. It is navigable, for about 40 miles from its mouth, by steamers of from 300 to 400 tons, and for another 125 miles by cargo boats, but the upper part of the river, being rocky and abounding in rapids, is only suitable for small boats and rafts.

The Kinta, Batang Padang, and Plus, the three largest tributaries of the Perak river, are all navigable by cargo boats.

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Of the other rivers, the Bernam, Dinding, Bruas, Larut, Sapetang, Kurau, and Krian may be mentioned, but the Bernam river is the only one navigable; it is two miles wide at its mouth, and is navigable for steamers for a distance of about 100 miles.

Chart, 1,355 [2,513]. Lat. 3° 50½′ N. Long. 100° 47½′ E.

Geology.—Four formations are represented:—(*a*) Granite rocks. (*b*) Large beds of gneiss, quartzite, schist and sandstone, overlaid, in many places, by thick beds of crystalline limestone. (*c*) Small sheets of trap rock. (*d*) River gravels, and other Quartenary deposits.

Ores of the following minerals have been found in the formations:—Tin, lead, iron, arsenic, gold, silver, copper, zinc, manganese, bismuth, tungsten, and titanium.

Flora and fauna.—The most conspicuous and useful plants of the Malay peninsula are gutta-percha, camphor tree, ebony, sapan, ratan, eagle wood, bamboo, nibung, and nipa palm. Of fruits, the most characteristic are the durian and the mangosteen, and of cultivated plants, rice, sugar cane, cotton, tobacco, yams, batata, cocoa, and areca palms. Climbing indigo and wild nutmegs are indigenous, but the true nutmeg, cinnamon, and clove have been introduced.

The fauna is unusually rich, and consists of the one-horned rhinoceros, the Malay tapir, the elephant, and the hog; also a small bear and two species of bison. The Asiatic tiger is found throughout the whole region of the peninsula.

There are nine species of quadrumanes, including the chimpanzee (*Simia troglodytes*), the kukang (*Lemur tardigradus*), and black and white unka.

The most characteristic birds are the rhinoceros hornbill (*Buceros*), the bangu or Javanese stork, Argus and pencilled pheasants, birds of Paradise, the myna or grackle (*Gracula religiosa*), the murei or dial bird (*Gracula saularis*), and humming-birds, kingfishers, fly-catchers, doves, and pigeons in endless variety. The islands are frequented by *Hirundo esculenta*, the swallow that builds edible nests.

The surrounding waters are inhabited by the halicore, or mermaid, a Sirenian whose Malay name is duyong.

Population.—In 1901 the population of the state was 329,665, consisting of 661 Europeans and Americans, 591 Eurasians, 149,375 Chinese, 141,723 Malays and other natives of the Archipelago, 34,710 Tamils and other natives of India, 1,235 other nationalities, and 1,370 floating population of all nationalities.

Products.—The principal product is tin, about 26,000 tons being exported annually. Coffee, sugar, and rice are also extensively cultivated, and rubber producing trees are being planted.

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Chart, 1,355 [2,513]. Lat. 4° 48½′ N. Long. 100° 38′ E.

Ports.—Port Weld is the port of Taipeng, the capital; Telok Anson on the Perak river has also considerable trade.

Communications.—Steamships.—There is daily communication by steamers between port Weld and Penang; also regular coasting steamers to port Swettenham.

Railways.—The mileage of railway open for traffic in 1902 was 170 miles, as follows:—Province Wellesley, Krian and Larut, Prai to Bukit Gantang, 64¼ miles; Larut:—Port Weld to Taipeng, 7¾ miles; Kinta Valley:—Telok Anson to Padang Rengas, 90¼ miles; Tapah road to Bidor, 7½ miles; and a short line at tanjong Malim. Through communication is established between Penang and Taipeng.

Chart, 1,188 [3,513].

Telegraphs.—Durian Sabatang on the Perak river is in telegraphic connection with Penang.

Climate.—The climate of the state is hot and moist, but, except at the bases of the mountain ranges, where there is always more or less malaria, is not unhealthy, and is more favourable for Europeans than that of most tropical countries. The Malays and Chinese suffer from febrile attacks, scrofulous affections and ulcers on the legs.

Being protected by the high mountains of Sumatra, on one side, and the range, forming the backbone of the peninsula, on the other, the country is only subject to the usual land and sea breezes, calms and variable winds interrupted by occasional squalls.

In the low country the temperature seldom rises higher than 86° Fahr. in the shade, while at night it frequently sinks to 65° Fahr.; on the hills being proportionately less. The rainfall is greatest from August to December, but rain falls during every month of the year.

Lat. 2° 22′ N. to 3° 50¾′ N. Long. 100° 47′ E. to 101° 57′ E.

SELÁNGOR, on the western coast of the Malay peninsula, is bounded on the north by Perak; on the south by Negri Sembilan; on the east by Pahang and Negri Sembilan; and on the west by the straits of Malacca; its total area is estimated at 3,200 square miles, its greatest breadth 48 miles, and it has a coast line of about 125 miles.

It was settled in 1718 under a Sultan, who in 1783 was driven out by the Dutch; British political relations with Selángor commenced in 1818, and a British Resident, appointed in 1874, advises the Sultan in the government.

The state is divided into the following six districts:—Kwala Lumpur, the headquarters of the Central Government offices; Klang, 14 miles from the mouth of the Klang river; Kwala Langat, an agricultural district and residence of the Sultan; Kwala Selángor, with the most important fisheries

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in the state; Ulu Langat, an inland mining district; and Ulu Selángor, adjoining Perak, a most important mining district. Each district is under the charge of a European District Officer under the Resident General. Chart, 1,355 [2,513]

Where the state touches the centre range of the peninsula there are several peaks over 5,000 feet and one 6,200 feet above high water, and it is drained by four rivers, the Bernam, the Selángor, the Klang, and the Langat.

Population.—In 1901 the total population was 168,789, consisting of 487 Europeans, 576 Eurasians, 108,768 Chinese, 1,875 Aborigines, 199 Boyanese, 4,166 Javanese, 28 Jawi Pekans, 33,997 Malays, 42 Manilamen, 16,748 Tamils and other natives of India, 31 Arabs, 233 Japanese, 58 Siamese, 255 Singalese and 1,326 miscellaneous.

Products.—A considerable area of land has been acquired by Europeans and others for the cultivation of Liberian coffee, trees producing rubber have been planted, and tapioca, rice, pepper, and sugar are grown.

Trade.—The principal exports are tin, coffee, hides, garuwood, tapioca, canes, rattan and gutta percha, and imports opium, salt, saltfish, rice, oil, tobacco, and tea; about 16,000 tons of tin are exported annually. The only duties are those on tin, opium and spirits.

Port.—Port Swettenham is the port, and Kwala Lumpur the chief town; it is the largest and best built town on the mainland of the peninsula, and has a good water supply. Lat. 3° 0′ N. Long. 101° 23½′ E.

Communications. — Steamships. — There is frequent and regular communication by means of coasting steamers between the Straits Settlements and Selángor.

Railways.—A railway connects port Swettenham with Klang, Kwala Lumpur, Kwala Kubu, and Tanjong Malim on the Perak frontier, a total distance of 74½ miles. There are 108 miles of railway in the State.

A line from Kwala Lumpur runs to Seremban, the capital of Negri Sembilan, *viâ* Kajang.

Telegraph.—Port Swettenham is connected by land wires with Malacca and Jelebu. There are 529 miles of wire in the State. Chart, 1,188 [3,513].

Climate.—The climate is similar to Perak. The rainfall, which averages in the centre about 100 inches, varies greatly on the coast and mountains; in 1888 the maximum at Klang was 49 inches, and at Ula Selángor in the mountains 328 inches.

NEGRI SEMBILAN, or the Nine States, consists of Johol, Ulu Muar, Jempol, Terachi, Inas, Gunong Pasir, Rembau, Tampin and Chart, 1,355 [2,513].

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Chart, 1,355 [2,513]. Lat. 2° 35′ N. to 2° 23′ N. Long. 101° 43′ E. to 101° 58′ E.

Gemencheh, and includes Sungi Ujong and Jelebu; the area of the Confederation is about 2,400 square miles. The coast district extends from the Lingi river (Malacca) on the east, to the Sepang river (Selángor) on the west.

The Confederation of States was originally peopled by the descent off numbers of Sakais from the hills, but about 1773 a Menangkabau prince was procured to rule over them. Such changes have taken place in the constitution of the states, that of the original nine only Johol and Rembau now remain, and Johol is the most ancient.

For administrative purposes the state is divided into five districts viz:—(*a*) Seremban, a town in Sungi Ujong, is the head quarters of the Government, with a British Resident; (*b*) The Coast District; (*c*) Jelebu; (*d*) Kwala Pilah; (*e*) Tampin; these last four have a District Officer.

Population.—The total population of the Confederation was 96,028 in 1901, and the population of the districts as follows:—Seremban 31,134, Coast District 8,351, Jelebu 8,254, Kwala Pilah 30,153, and Tampin 18,136.

Products.— The products of the districts are as follows:—

Seremban.—Tin is largely exported; there are many European coffee estates, and rice is widely cultivated.

Coast District.—Coffee, tapioca, pepper, gambier, cocoa nuts and rice are all extensively grown.

Jelebu.—Tin is produced by European companies as well as Chinese, and fruit and rice are grown in many valleys.

Kwala Pilah.—Tin, tapioca, native, agricultural and jungle produce, and fruit of almost every description are exported; rice is very extensively cultivated, and gold is being mined at Batu Bersawah and elsewhere.

Tampin.—Tapioca, coffee, jungle produce and pigs are exported; rice, fruit and native produce generally are abundantly cultivated, and there is said to be gold in the district.

Trade.—The exports, consisting of tin (of which about 5,000 tons are exported annually), gambier, tapioca, pepper, coffee, &c., were valued at $7,665,369, and imports of rice, opium, specie, and other articles, $4,496,660 in 1901.

Lat. 2° 31½′ N. Long. 101° 47¼′ E.

Ports.—Arang Arang is the chief port of the state.

Communications.—Steamships.—There is regular communication from Arang Arang by steam vessels to Singapore, Malacca, port Swettenham, Telok Anson, Sepang and Jugra.

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Railways.—Arang Arang is connected by railway with Seremban, a distance of 24½ miles; there is also a line from Seremban to Kajang.

Telegraph.—A submarine telegraph cable connects Malacca with Penang, and with Singapore. Chart, 1,188 [3,513].

Roads.—There are 254 miles of cart road and 172 miles of bridle path in the state.

Climate.—The climate along the coast is dry and the air invigorating; the mean temperature for 1901 was 83° Fahr. Inland the climate is considered good; the mean rainfall for 1901 was 91·09 inches, September being the driest month with 2·42 inches and April the wettest with 17·91 inches.

In the same year the death rate in the hospitals for the whole state was 6.93 per cent.

JOHOR, which comprises Muar Kiri, includes the whole of the southern end of the Malay peninsula from lat. 2° 40′ N. to tanjong Penyusuh, including the small islands which lie off this coast, and is bounded on the south by the Old Strait of Singapore and the strait of Malacca; on the west by Malacca and Negri Sembilan; and on the north by Pahang. The area of Johor is about 9,000 square miles. Chart, 1,355 [2,513]. Lat. 2° 3′ N. to 1° 22½′ N. Long. 101° 58′ E. to 104° 17′ E.

Johor took an important part in the struggle, over Malacca, between the Portuguese and the Dutch; in 1857 the Sultan placed his foreign relations in the hands of the British Government, and in 1885 was recognised as the Sultan of the State and Territory of Johor.

The form of government is akin to that of a constitutional monarchy, and in many respects resembles that of the neighbouring colony. Johor Bahru, on the Old Strait of Singapore, is the capital.

Mountains.—The country is, as a whole, less mountainous than any other part of the peninsula; the hills are all detached groups or portions of two interrupted chains—Gunong Ledang or Mount Ophir in Muar (4,186 feet above high water) is probably the highest peak in the state, and the Blumut hills, 60 miles E.S.E. from Mount Ophir and 3,180 feet above high water, the principal mountain group. Lat. 2° 22′ N. Long. 102° 36′ E.

Rivers.—The three largest rivers are the Muar, the Endau and the Johor, of which the Muar is the largest; it rises in Negri Sembilan, flowing south-east and then south-west. The Endau, which forms the northern boundary with Pahang, flows from the Segâmat hills, and the Johor, rising in the Blumut hills, opens out into a wide estuary opposite the eastern end of Singapore island. Lat. 2° 3½′ N. Long. 102° 3′ E. Lat. 2° 40′ N. Long. 103° 3½′ E. Lat 1° 26′ N. Long. 104° 1′ E.

Minerals.—Iron, the only mineral in which the country is really rich, is found almost everywhere, but is unworked. Important deposits of tin have been found, and considerable tin mining is carried on; gold is found in some localities, and a mine is worked near Gunong Ledang.

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Chart, 1,355 [2,513].

Population.—The population of Johor is about 200,000, consisting approximately of 35,000 Malays; 150,000 Chinese; and 15,000 Javanese.

Products.—Gambier and pepper are cultivated by the Chinese all over the country; European plantations are chiefly sago, coffee, tea, and cocoa.

Trade.—The principal exports are gambier, pepper, coffee, sago, and the natural products of timber, rattans, damar, &c. Betel (areca) nut is largely produced in the Padang district of Muar.

Lat. 1° 27′ N. Long. 103° 45′ E.

Ports.—Johor Bahru may be considered the chief port of Johor, as almost all the produce is shipped from Singapore, and Bandar Maharani, the port of Muar.

Communications.—Steamships.—Bandar Maharani, at the entrance of the Muar river, has steamship communication with Singapore every second day, and a steam ferry connects Johor Bahru with Singapore island.

Railways.—A light railway runs from Bandar Maharani, through the Padang district, to Parit Jawa, a distance of 8 miles, and it is proposed to construct a railway from Johor Bahru through the centre of Johor state to Sagamat.

Climate.—The climate is remarkably healthy, and the introduction of water supply has made epidemics rare. The highest temperature is about 98·5 Fahr.; lowest 68.2, and the average rainfall 97·28 inches.

PAHANG is the largest of the states; for its description, *see* China Directory, Vol. II.

Chart, 748 [2,364]. Lat. 5° 40′ N. to 5° 55′ S. Long. 95° 16′ E. to 106° 3′ E.

NETHERLANDS INDIA.—SUMATRA ISLAND is about 960 miles in length in a north-west and south-east direction, its greatest breadth being about 220 miles and its area 170,744 square miles; it is the largest of the islands of the Malay archipelago, except Borneo, and is about three times the size of Java. The equator passes nearly through the island.

Sumatra was first visited in 1590 by the Portuguese; by the Dutch in 1600; and by the British two years afterwards. The latter continued to establish factories and form settlements in the island during the 17th century. These settlements were retained by the British until 1825, when they were ceded to the Dutch in exchange for Malacca. Most of the trading ports are in the hands of the Dutch, who claim the sovereignty of the island.

There are seven important political sub-divisions of the country, and the Governor of the whole Government has his residence at Padang.

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Mountains.—A lofty chain of mountains extends throughout its whole length of the island, the ranges being in many parts double and treble, but in general situated much nearer to the western than the eastern coast, the western slopes descending rapidly towards the ocean and the eastern looking out over a vast alluvial tract of unusual uniformity. Chart, 748 [2,364].

This great alluvial plain, generally only a few feet above the level of the sea, is 600 miles in length and from 60 to 110 miles in width, and, with the rare exception of a few patches on the river banks, is usually beyond the reach of the tide, and covered with a stupendous forest of primeval origin. The south-eastern extremity of the island is little better than a forest of mangrove growing out of a morass. The greater part of the island is a sterile or intractable wilderness, and considering its size the country is thinly populated.

Volcanoes.—Gunong Korintji or Mount Indrapura (12,678 feet) the culminating peak, smokes from time to time; Merapi, 90 miles N.W. by N. from Gunong Korintji, the most active, was in full eruption in 1807, 1822, 1834, 1845, 1863, 1864, and 1872. Mount Talang, 24 miles south of Gunong Korintji, has three craters, one filled with molten sulphur. Chart, 2,761 [2,540]. Lat. 1° 42′ S. Long. 101° 16′ E.

Rivers.—The watercourses, owing to the configuration, are comparatively short on the western side, but those of the eastern slope are longer, navigable for vessels, and, in their lower courses, form considerable deltas.

The middle and lower courses of the larger rivers, as the Musi, the Jambie, the Indragiri, the Kampar, the Siak, the Rokan, the Panei, the Bila, and the Asahan (all flowing eastward) are navigable over considerable distances for vessels drawing from 6 to 10 feet water. The Musi and the Jambie are navigable for 372 and 497 miles respectively.

Lakes.—The mountain regions contain numerous lakes, many evidently craters of extinct volcanoes; they are Tao Silatahi, with Tao Muara and Tao Balige, its offshoots; Manindji, Pinkarah, Korintji, Ran Au and lake of the Cross Kotas.

Geology.—The highlands of Sumatra consist of old slates and clay schists combined with hornblende, talc and other schists and traversed by veins of quartz.

Carboniferous rocks (marls, sandstones, limestones, &c.) are well developed in some places.

The tertiary formation is in four divisions. The oldest or breccia division consists of debris of carboniferous limestone, syenites and granites, above which is the second division of sandstones some 1,000 feet in thickness. The third division consists of marly sandstones of evidently marine origin; and the fourth of limestone rich in remains of corals, molluscs and echinids.

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Minerals.—Gold occurs in several regions, and mines have been long worked in Menang Kabau and the interior of Padang; tin, copper, and iron are also worked. Coal seams exist in the Malabub valley, in the Sinamu valley and on both sides of the Ombilin river, and lignite, of good quality, is found in several localities. Arsenic, saltpetre, alum, naphtha and sulphur may be collected in the volcanic districts, and oil wells are worked at Langkat and other places.

Flora and fauna.—In the northern part of the island the pine tree (*Pinus Merkusii*) has advanced almost to the equator, and in the southern part are a variety of species characteristic of the Australian region. As a timber-producing country the island ranks high among the richly-wooded lands of the archipelago.

The cocoa-nut, betel, bamboo, and sugar-cane, and an abundance of tropical fruits, are indigenous.

The principal cultivated plants, apart from sugar-cane and rice, are the cocoa-nut-palm, the areng palm, areca and sago palms, maize, yams, and sweet potatoes. The chief fruit trees are Indian tamarind, blimbing, pomegranate, jambosa, guava, papaw, orange and lemon.

There are five species of apes, viz.:—the siamang, the ungho, the simpei, the tjigah, and the pig-tail ape. The flying cat or flying lemur and kalong, "flying fox," are common, and bats are represented by about twenty species; the tiger and clouded tiger or riman bulu, the bear and wild dog are found, and the coffee rat (*Paradoxurus musanga*) is very abundant.

Elephants are represented by a peculiar species. Rhinoceros, the *Sus vittatus* and *Tapirus indicus*, are common, and there are two kinds of deer.

Population.—In 1900 the population was estimated at 3,000,000, of which 6,037 were Europeans.

Products.—Buffaloes are the most important live stock; the breed of horses is small but well made and hardy; sheep also are small.

The staple industry of the country is agriculture, and among the vegetable products the most important are pepper and tobacco; the minor agricultural products are Liberian coffee and tea. Jungle produce, formerly exported considerably, is getting scarce, the trees being felled for the purpose of planting tobacco.

Trade.—The chief articles of export are pepper, tobacco, hides, coffee, nutmegs, rattans, coral, rice, camphor, gutta-percha and copra. Almost all the necessaries of life have to be imported, and the imports are chiefly woollen goods, wines, beer, spirits, tin-ware, clothing, rice, metals, hardware and cutlery.

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Ports.—Olehléh is the principal port on the north coast; Deli on the east coast; Telok Betung on the south coast, and Padang on the west coast. Lat. 5° 35′ N. Long. 95° 21′ E.

Communications.—Steamships.—Deli has communication by steamer with Singapore, Penang, and Kwalu Assahan, and there are fortnightly steamers to Panch (Bila), Bagan, Si Api Api, and monthly to Bengkalis, Siak, &c.

The Koninklijke Paketvaart Maatschappij (Royal Packet Company) have the following services of steamers to ports on the coasts of Sumatra and the adjacent islands:—

Weekly between Palembang, Muntok and Batavia.

Every ten days between Olehléh and Penang.

Fortnightly between Penang and Batavia, calling at Edi, Semawi, Sigli, Sabang bay, Olehléh, Padang, Benkulen, Engano, Kru, and Telok Betung.

Fortnightly from Padang to Indrapura, Benkulen, Manna, Bintuhan, Kru, and Telok Betung.

Fortnightly from Singapore and Penang to Sabang bay, Olehléh, Pulo Raja, Melambu, Tampat Tuan, Singkel, Baros, Siboga, Natal, and Padang. These steamers touch every month at Sinabang, Gunong Sitoli, Ayer Bangies, Priaman and Tello.

Fortnightly from Palembang to Muara Saba, Simpang and Jambie.

Fortnightly from Belawan to Rhio, Muntok and Batavia.

Fortnightly between Belawan and Sabang.

Fortnightly from Belawan to Tanjong Balei, Sungi Panei and Singapore.

Fortnightly between Belitung and Singapore.

Monthly from Belawan to Benkalis, Siak, Tanjong Kala, and Edi.

Railways.—A railway from Belawan passes through Labuan Deli to Medan, and to Deli Tua, with branches at Medan to Timbang Langkat, to Serdang and to Bedagei. A further extension to Aru bay has been commenced. Emma haven, the port of Padang, is connected with the town by a railway, and from Padang there is a cog-wheel railway to fort de Kock and Paja Kombo.

Telegraphs.—Olehléh is connected with pulo Weh and with Deli by submarine cable, and a cable connects Deli and Penang. On the west coast of Sumatra there is a land wire from Singkel to Telok Betung with telegraph stations at Tapanuli (where there is a land wire to Deli), Padang, Moko Moko, Palembang and Telok Betung. From Palembang a cable crosses Banka strait to Muntok, and from Telok Betung a submarine cable crosses the strait of Sunda to Batavia. A land wire connects Muntok and Pankal Pinang, from which place there is a cable to Cheruchup. Chart. 1,188 [3,513].

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Money, &c.—Gold is used in pieces of 10 guilders; the silver guilder is the standard coin, its value amounting to 1*s.* 8½*d.*

The silver coins are—

Rijksdaalder (*ringgit*)	= 2·50	guilders.
Gulden (*Perak, roepia*)	= 1·0	,,
Halve gulden (*stenga roepia*)	= 0·50	,,
Kwart gulden (*kwart, stali*)	= 0·25	,,
Dubbeltje (*ketip, pitjis*)	= 0·10	,,
Stuiver (*lima sen*)	= 0·05	,,

The copper coins consist of—

2½ cents (*gobang*)	= 0·025	,,
1 cent (*sen*)	= 0·01	,,
½ cent (*stenga sen*)	= 0·005	,,

The weights and measures are generally the metric system, as in Netherlands.

Climate.—The climate, more particularly on the low-lying flats forming the east coast of Sumatra, is unhealthy, but the heat is not so great as might be supposed from its being under the equator. The principal scourge is tropical fever, which never ceases to work havoc among Europeans and natives alike; the attacks are sudden, lasting about a week, and sometimes fatal; dysentery is also prevalent. Cholera is always more or less endemic, at times assuming an epidemic form, and carrying off large numbers of natives.

It is necessary, therefore, to use every precaution to preserve the health of the crew, should any stay be made on the coast. Landing, or sleeping on shore, or on deck at night except under awnings, should be avoided. The water from ponds or wells near the shore is very bad, and running water should be procured, if possible, and invariably boiled for drinking.

The interior of the island is comparatively cool and pleasant.

The climate of the north coast of Sumatra (Acheh district) is damp and also unhealthy. The temperature ranges from 77° to 95°, and is subject to great and sudden changes, which vary in different localities. On the north and north-west coast the months of March and April are very hot; on the east coast the whole period of the south-west monsoon is the same.

The climate is not everywhere equally unhealthy; for instance, it is noteworthy that during epidemics the mortality is low at Olehléh, as compared with the neighbouring Kota Raja, while there is comparatively little malaria in Olehléh. The extremely damp months of the latter half of the year are most favourable to the development of malaria and beri-beri (an acute disease producing great muscular debility and painful rigidity of the limbs, &c.), whereas the months of January and February are generally healthier.

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Rigas, on the west coast, has the reputation of being one of the most unhealthy ports; Benkulen, on the same coast, is but little better. Padang, on this coast, is one of the least unhealthy; here in the highlands the temperature is seldom above 70° to 80° in the middle of the day.

Swell.—At the north and north-east portion of Sumatra, during the north-east monsoon, there is generally a swell on the coast, which gives rise to a considerable sea in the afternoon if accompanied by a stiff sea breeze. Both subside quickly, so that the water is generally smooth at night and in the forenoon. At times the monsoon blows strongly for some days, at which times communication with the shore is impracticable. December and January are the worst months. If the wind holds until nightfall, all boats should be hoisted up. The south-west monsoon is the best for landing on this portion of Sumatra.

At the north-west end of Sumatra, between Acheh head and Pedro point, the south-west monsoon at times throws a high sea on to the coast, rendering it necessary for vessels at anchor off Olehléh to shift farther out; a squall sometimes comes from the north-west, rendering it a lee shore, and the water will break in a depth of about 3 fathoms.

On the west coast there is nearly always a swell from north-west or south-west. During the south-west monsoon the swell often comes from both directions at the same time, causing a confused sea and breakers on the coast. May, June and July are the worst months.

During the north-east monsoon good anchorage and smooth water may nearly always be found near the shore. This monsoon is the favourable one for trade and navigation, but native boats should be used for landing or embarking cargo.

WINDS AND WEATHER. — Indian Ocean. — The south-east trade wind, which in the Indian Ocean extends from the west coast of Australia to within a few degrees of Madagascar, will be found between the parallels of 4° and 25° South, from April to September, and between 10° and 30° South, from November to March. To the southward of this trade, as far as 60° or 70° S., the prevailing winds are westerly, which will be found with more or less force and irregularity at all seasons. Charts, 2,931 to 2,934 [3,527 *a-d*].

Monsoons. — The monsoons southward of the equator blow from South-east from the middle of April till the middle of September, and from North-west varying to W.S.W. from October to March.

The South-east or easterly monsoon, which is the period of fine season, may be considered an extension of the south-east trade, blowing within three or four degrees of the equator when the sun is near the northern tropic, and receding to 10° or 11° S. when the sun is near the southern tropic.

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Charts, 2,931 to 2,934 [3,527 *a-d*].

The North-west or westerly monsoon is subject to many irregularities, with occasional heavy gales, thunder, lightning, and rain; it sometimes does not set in before November or December, rarely blowing with regularity and strength except in December and January, when it occupies a space comprised between lat. 10° or 12° S., and 2° or 3° N.

Cyclones.—In making the passage between the Cape of Good Hope and Sunda strait, or *vice versâ*, the possibility of meeting a cyclone must be borne in mind. They are most frequent between the months of November and May during the north-west monsoon; the remaining months being almost exempt. Some of these storms form in the neighbourhood of the Cocos or Keeling islands, thence, after taking a west-south-west direction, recurve either eastward of Mauritius or between it and Madagascar.

Others form to the northward of Mauritius, whence they usually work southward between it and Madagascar, though occasionally one escapes northward of that island into the Mozambique channel. Others, again, form off (not near) the west coast of Sumatra in 3° to 4° South latitude, whence, working south-westward, they recurve in about 80° or 90° East longitude.

The rate of progression of the greater number of these storms is from 50 to 200 miles per day, whilst others are nearly stationary; the proportion is about 2 to 1 respectively. The very marked difference in the proportion of Progressive storms to those classed as Stationary in the different months of the Cyclone season is a valuable fact for the seamen, if it can be considered established.

The knowledge that in the early and late periods of the cyclone season the chances are about even that the storm is stationary, and that in the height of the season (February) the chances are very great (about 10 to 1) that a cyclone is in rapid progression, would greatly influence the action of a vessel in the neighbourhood of a storm; but these proportions are too strongly marked throughout the 35 years' observations that have been discussed, to admit of much doubt that the ratio between the Progressive and Stationary cyclones is different in different parts of the season. The doubt whether full information of every storm has been obtained must prevent the proportions being accepted as absolutely correct.

On the homeward route, it should be borne in mind, that if freshening north-east or easterly winds with falling barometer are met with, the vessel may be overtaking a cyclone, and as these winds often, if not always, blow towards the centre, necessary steps should be taken for avoiding it.

The relative frequency for the whole series of 35 years ending 1885, for the several months, are as follows. For full details, with yearly and monthly charts showing the tracks of these storms, *see* "Cyclone Tracks in

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the South Indian Ocean," from information compiled by Dr. Meldrum, C.M.G., F.R.S., published under the authority of the Meteorological Council, 1891. Charts, 2,931 to 2,934 [3,527 *a-d*].

Month.	Progressive Storms.		Stationary Storms.		Totals.	
	Total.	Frequency.	Total.	Frequency.	Stationary and Progressive.	Frequency.
October -	2	1 in 18 years	3	1 in 12 years	5	1 in 7 years
November	12	1 „ 3 „	13	1 „ 3 „	25	5 „ 7 „
December	23	2 „ 3 „	10	2 „ 7 „	33	1 „ 1 „
January -	52	3 „ 2 „	19	1 „ 2 „	71	2 „ 1 „
February -	55	5 „ 3 „	6	1 „ 6 „	61	5 „ 3 „
March -	40	4 „ 3 „	19	1 „ 2 „	59	5 „ 3 „
April -	26	3 „ 4 „	24	2 „ 3 „	50	3 „ 2 „
May -	8	2 „ 9 „	11	1 „ 3 „	19	1 „ 2 „
June -	1	1 „ 35 „	2	1 „ 18 „	3	1 „ 12 „
July -	1	1 „ 35 „	1	1 „ 35 „	2	1 „ 18 „
August -	0	—	—	—	—	—
September	0	—	—	—	—	—

Cyclones are not met with *near* the coasts treated of in this volume.

MALACCA STRAIT.—Although Malacca strait is within the limits of the north-east and south-west monsoons of the Indian ocean, yet, on account of the high land on either side of the strait, the winds are variable; but land and sea breezes are regular on both coasts. In the offing, the monsoons are only regular when they are at their height in the adjacent seas; even then, however, the wind is moderate in the strait and only lasts during a part of the day. The monsoons become more regular near Singapore.

South-west monsoon.—Between Acheh head and Salang island the south-west monsoon commences in the latter part of April or the early part of May, and ceases in October; in November there are calms and variables, and westerly winds frequently prevail.

The south-west monsoon seldom blows far into the strait. In the middle of the strait during this season, variable winds, chiefly those from S.E. and S.W., prevail with long calms. On the Sumatra side light winds and calms prevail, and heavy squalls from the land are experienced

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Charts, 2,931 to 2,934 [3,527 *a-d*].

during the night. On the Malayan side there are fewer calms and seldom any squalls; variable winds or land and sea breezes are experienced.

During the south-west monsoon, the weather is generally cloudy and stormy, especially when the monsoon is at its height.

Sumatras, or squalls from the south-west, are more common during the south-west monsoon than in the north-east monsoon. They generally blow during the first part of the night, are sometimes sudden and severe, and accompanied by thunder, lightning, and rain; they are more frequently met with on the north coast of Sumatra, and on the Malay coast between Parcelar hill and Karimon islands. Here they often blow for six or eight hours at a time as a strong or moderate gale. Their characteristic is that of an arch squall.

North-westers are not so frequently felt as the Sumatras; they are most common during the south-west monsoon and occur in the north-western part of the strait between Acheh head and Aroa islands, but sometimes blow through as far as Singapore strait. These winds are sometimes severe at their commencement, but their strength soon abates. They are generally preceded by a black cloud arch which rises rapidly from the horizon towards the zenith, often allowing not more than sufficient time to reduce sail after its first appearance. They are sometimes accompanied by lightning, thunder, and heavy rain.

The North-east monsoon prevails in the western entrance of Malacca strait from November to April, which is the fair season, the weather being then more settled; there are seldom any hard squalls, and there is less thunder, lightning, and much less rain than in the other season.

In November the winds are variable, frequently from North-west and West (extending from as far westward as Ceylon), although occasionally the north-east winds set in in November. From this period to March the north-east monsoon is strongest, but at times North-west and West winds, of one or two days' duration, have been experienced in every month when the north-east monsoon should prevail. Late in March the north-east and northerly winds become light and variable, with strong land breezes at night. On the Malayan side these breezes commence between 8 and 10 p.m., and last four or five hours, sometimes all night; this is more generally the case between mount Formosa and cape Rachado. There is less calm on the Malayan than on the Sumatra side of the strait.

Lat. 1° 16′ N. to 1° 28′ N. Long. 103° 38′ E. to 104° 0¼′ E.

MALAY PENINSULA.—Singapore.—During January, February and March, the north-east monsoon period, the winds from N.E. to N.W. predominate, with frequent calms. April and May, the commencement of the south-west monsoon, the directions are principally from N.W., W.N.W. and West. In June, July and August, from S.W.; and from September to November variables (West to N.N.W.).

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The north-east monsoon sets in in December. The greatest velocity of the wind during the year under discussion (1890) was 193 miles in the 24 hours, on the 4th December. Charts, 2,931 to 2,934 [.

Malacca. — N.N.E. and W.S.W. winds are prevalent during the first six months of the year. In the remaining months the winds are principally South, S.E., and N.W. The greatest velocity registered in 1890 in 24 hours was 178 miles, on the 26th December. Lat. 2° 23′ N. to 2° 3′ N. Long. 101° 58′ E. to 102° 34′ E.

Province Wellesley. — North-west winds prevail during January and February, and south-west winds from March to May, and in the other months, S.S.W., N.N.E. and N.E. The greatest velocity in 24 hours (in 1890) was 175 miles, on the 4th February. Lat. 5° 7½′ N. to 5° 34′ N. Long. 100° 20½′ to 100° 24¾′ E.

Penang.—The prevailing winds from January to June are N.E. and N.W. During the latter half of the year, north-west winds predominate. The greatest velocity in 24 hours (in 1890) was 255 miles, on the 29th March. Lat. 5° 14½′ N. to 5° 28′ N. Long. 100° 10½′ E. to 100° 21′ E.

Salang island.—(Junkseylon).— At Salang island, in the northern entrance to Malacca strait, the monsoons are more regular than at the Straits Settlements. The north-east monsoon sets in in December, with strong gales from N.E. to N.W., accompanied by lightning, and continues until March; this is the dry monsoon, and much sickness prevails on shore between February and April. In March, the monsoon is weak with occasional squalls. April is the change to winds from West to North with heavy squalls. Lat. 8° 10′ N. to 7° 46′ N. Long. 98° 15½′ E. to 98° 50′ E.

The burst of the south-west monsoon occurs early in May; it has fairly set in by June, and heavy squalls and rain are frequent. It continues, with many days rain and as many days fine, until October. November is variable, with heavy squalls from all quarters. The maximum days' rain per month (about 20) occur in August; in January and the early part of February there is little or no rain.

SUMATRA, north coast.—The south-west monsoon prevails from about April to November, and the north-east monsoon from about November to April as previously stated for Malacca strait. During the south-west monsoon, the wind frequently holds both day and night between Acheh head and Pedir point, whilst farther eastward it is not so permanent.

In the strength of the north-east monsoon, the wind blows from East to N.E. from about 10 a.m. to 4 p.m., strengthening near the close; it then begins to drop and is usually calm about sundown, and there is a land breeze during the night. In April, S.W. and West winds begin, and the south-west monsoon is established in May. For Sumatras, *see* page 26. Waterspouts are seen off this coast at times.

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Charts, 2,931 to 2,934 [3,527 *a-d*].

East coast.—The coast between Jambu Ayer and Deli is not so much under the influence of the prevailing monsoon, as the direction of wind is completely altered by the conformation of the land, the broad plains, at the foot of the high mountains, being most favourable to the regularity of land and sea breezes, and the wind is generally N.E. by day and S.W. by night all the year round on the coast. During the north-east monsoon north-east winds are more prevalent in January, February and March. North-west winds sometimes occur at night in February and March, but they are infrequent compared with the winds from West and South-west.

Throughout the year, north-west and south-west winds are observed at uncertain periods for several days at a time and generally accompanied by fine weather. Sumatras are more frequent here than on the north coast.

West coast. — The influence of the south-west and north-east monsoons are felt on the west coast of Sumatra as far south as about lat. 2° N., southward of which the monsoons of the Indian ocean are experienced. But from Acheh head to lat. 4° N. the winds are quite different from those between 4° N. and 2° N.

Between Acheh head and lat. 4° N., the south-west monsoon prevails from May to October, inclusive, and the north-east monsoon from December to March. During the height of the south-west monsoon, the sea breeze prevails at times during the night, but generally speaking the land winds are clearly perceptible by the deflection of the wind to S.E. or North during the night. Squalls are frequent during the monsoon and there is often a considerable sea along this coast. It is somewhat hazy at times.

The north-east monsoon period is from December to March, and it is less strongly marked. When the monsoon has fairly set in, there is usually a gentle southerly breeze in the morning, followed by a calm, and in the afternoon a light sea breeze. After sunset comes the land wind, which prevails all night.

Between lat. 4° N., and lat. 2° N., is the region of calms and light variable winds. From the Batavian meteorological records, calms occur more frequently here than in other portions of the Netherlands India possessions; squalls occur occasionally.

The influence of the monsoons only appears in a westerly tendency of the day wind from March to November, and an easterly tendency from November to March; at night, except in January and February, there is always a northerly tendency in the wind.

In April, S.W. and N.W. winds are most prevalent both night and day. From May the N.W. winds become more prominent. During the

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following months they increase and reach their maximum in October; at times these winds cause a considerable sea. Charts, 2,931 to 2,934 [3,527 *a-d*].

August is marked by a frequency of north-east winds. At night, the winds from May to November are from N.W. to N.E.

From November to January, the wind is very variable in the daytime, at night it is generally from N.E. to East. In February, the wind is often from S.E. to East, but there is also much westerly wind. At night, the winds are divided between S.W. and E.S.E., or S.E. winds. March is marked by a westerly wind by day, and N.E. or East winds at night.

Southward of the equator, in the offing, the winds gradually merge into those prevailing in Sunda strait and the Java sea.

At Padang (lat. 1° S.), when the south-east monsoon is well established in the Indian ocean, then it is noticeable in Padang; these winds, however, seldom prevail longer than a couple of hours, and are mostly light.

The prevalent winds are N.W. and West; in the months of February, March, and April, usually accompanied by fair weather; in May, June, and July, alternating from N.W. to S.W., with thunder and rain squalls.

In the months of August, up to and including December, the N.W. and West winds are generally well established, accompanied by hard squalls, outbursts from the north-west, a high sea from north-west to south-west, and much rain. The squalls usually come without warning, with violent gusts of wind. Day after day during the months mentioned the wind will sometimes blow stiffly from N.W. and West; in the month of January the wind is variable, but it is then mostly light and calm. There is usually a land wind at night.

South-east coast of Sumatra and Java sea.—The easterly or south-east monsoon begins in April, is at its greatest strength from June to August, and ends in October, when the winds become variable. The north-west or westerly monsoon commences early in November, is at its height from December to February, and ceases at the end of March, when it is succeeded by light winds, squalls and rain.

Easterly monsoon. — The easterly monsoon is only fairly established on the south-east coast of Sumatra within 20 miles of the shore, during the months of July, August, and September. Towards Sunda strait it begins earlier; here also strong south-westerly winds frequently occur, generally setting in at about sunset and continuing constant during the night.

Near the coast the monsoon does not blow with equal force; when it has blown for several days with a force between a strong breeze to a fresh gale, from E.N.E. to E.S.E., there generally follows several days of calm, which periods are more frequent towards Banka strait, where the wind is then mostly light from S.S.E. t S.S.W.

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Charts, 2,931 to 2,934 [3,527 *a-d*].

During this monsoon, the atmosphere is very hazy, especially near the horizon, but it sometimes clears up towards evening; with strong winds the haze increases and the water assumes a milky, light-blue colour, which phenomenon is here known as the Tongara Putih, or the white south-easter.

Should several days of calm succeed, the haze lessens, and there may succeed several days of clear atmosphere, especially in the northern portion, where heavy rain and thunder showers occasionally occur.

These winds blowing on shore cause a considerable swell, rendering anchorage uncomfortable, as the current running either north or south, causes vessels to ride broadside on.

Northward of lat. 4° S., there is no regular easterly monsoon; although south-east and east winds are prevalent from July to October, they are too irregular to merit the title of monsoon.

Westerly monsoon.—The westerly monsoon is well established in the month of December, and continues until April. This is the period of clear weather. The change is usually effected without any violent squalls or calms of long durations.

Until about mid-January the wind varies from S.S.W. to W.S.W., when it shifts more to the westward. The wind usually inclines to the north-eastward in the afternoon and blows for some hours.

Heavy thunder storms and rain-squalls, with hard gales from S.W. to N.W., occur during this monsoon, and these are more frequent in proportion as Banka strait is approached. The air is then very clear, and the coast of Sumatra, which shows as a dark streak on the horizon, can be sighted at a distance of 20 miles from aloft. By day, easterly and north-easterly winds frequently blow, but towards evening the heavy squalls, which during the afternoon have been gathering in the west, inevitably set in with violence, and the westerly wind which follows continues to prevail with more or less force during the night and morning.

Change of monsoons.—From April to July and from October to December is the change of monsoons within 20 miles of the coast of Sumatra.

Near Banka strait, even during the period of the easterly monsoon, strong southerly winds with rain frequently occur. The weather is generally finest during the change from the westerly to the easterly monsoon (April and May); the frequent calms, however, render the weather very oppressive.

Banka, Gaspar and Carimata straits.—In Banka, Gaspar and Carimata straits the monsoons prevail as in the Java sea. But the times of the changes of these monsoons and their direction are somewhat irregular, and the south-east monsoon is subject to calms.

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In Banka straits the winds follow the direction of the coast, though with slight variations from the influence of the land and sea breezes; the monsoon is felt as a fresh breeze when working against it. Charts, 2,931 to 2,934 [3,527 *a–d*].

In Gaspar and Carimata straits, as a rule, the settled weather of the south-east monsoon can be counted on from about the end of May; the wind then blows strongly between S.E. and S.S.E. until the beginning of October, accompanied by a dry but misty atmosphere. Although it is clear overhead, the horizon very seldom clears during this season, and the land is difficult to distinguish; about mid-day is the least hazy.

In the beginning of October the character of the weather changes, light south-east and southerly winds are felt up to mid-day, and are succeeded by land breezes from across the marshes of the west coast of Borneo, and are found a considerable distance from the shore. Thunder storms, much rain and violent squalls from the westward, alternating with successive days of calm fair weather, usher in the north-west monsoon. Numerous water-spouts may be seen at the change of the monsoons, and also during the north-west monsoon. From February, unsettled weather precedes the change of the monsoon, and squalls occur from the north-westward.

November, the first month of the north-west monsoon, is the first of the four months of maximum rain; the violent gales from the north-west which occur in this month generally commence with a bluish leaden appearance on the horizon, and a high sea gets up in the northern part of the strait.

December is the most boisterous month; in January there is generally a constant northerly wind, but in February it again becomes unsettled, with squalls from the north-west.

The peculiar haze which accompanies the south-east monsoon is sometimes seen during the north-west monsoon, and when seen some days of continuous north wind may almost certainly be reckoned on.

Rainfall.—Straits Settlements.—In the Straits Settlements rain falls throughout the year. Observations taken during the 10 years, 1891–1900, show that the average number of rainy days in the year, at Singapore, the east extreme of the Straits Settlements, is 178, and the average annual rainfall is 95·8 inches. The average monthly rainfall ranges from 5·65 inches to 11·03 inches; December and January have the heaviest, and February and June the lightest average fall. During the same period the extremes have been the year 1893, with 173 rainy days and an aggregate fall of 111·4 inches, and the year 1896, with 166 days and an aggregate fall of 74·07 inches.

Observations taken at Penang, the west extreme of the Straits Settlements, during a period of nine years, ending 1890, show the average annual rainfall as 111·8 inches. The average monthly rainfall ranges from

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2·8 inches to 19·1 inches. September and October have the heaviest, and February has the lightest fall.

The mean rainfall at Singapore for 1895–1902 both inclusive was 94·9, the heaviest rainfall in 24 hours being 6·9 inches in January, and as much as 25·56 inches fell in one month.

At Penang the mean rainfall during the same years was 120·3 inches; at Province Wellesley 103·9 inches; at Malacca 76·8 inches; and at the Dindings 87·7 inches. The greatest fall in 24 hours was 7·5 inches at the Dindings in April 1898, the same amount falling in one day at Malacca in February 1901, the greatest monthly rainfall registered being 41·17 inches in October 1897.

The rainfall in 1900–02 in the several Settlements was as follows:—

——	1900.	1901.	1902.
	Inches.	Inches.	Inches.
Singapore - - - - -	90·98	83·56	82·28
Penang - - - - -	108 94	126·04	94·56
Province Wellesley - -	101·15	105·63	91·27
Malacca - - - - -	65·69	87·13	79.20
The Dindings - - -	71·94	89·58	89·91

Sumatra.—Rain occurs in every month of the year in Sumatra. The period of the greater or less rainfall on the northern half of the island does not correspond with the periods of the monsoons; there is, however, a certain regularity in the increase and decrease of the proportion of wet days in the course of the year.

The greatest rainfall on the north coast of Acheh, and the off-lying islands, usually occurs in the months of October and November, the months preceding the change to the north-east monsoon, and the least rainfall in February and March, the months preceding the change to the south-west monsoon. The rainfall on the off-lying islands is about double that on the north coast. *See* table of rainfall.

On the east coast of Acheh, where the monsoons are a little later, the rainfall is heaviest in November and December.

There is no more connection between the rainfall and the prevailing monsoon on the west coast of Acheh than on the north and east coasts; moreover, the rainfall does not at all depend on the time of the year there. In general there is not much difference in the average rainfall in different months. All that can be stated is, that on the northern portion between Acheh head and about lat. 4° N., the rainfall is less (per month) during the first four months than during the rest of the year, and that February may be called a dry month.

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Between about lat. 2° N. and Sunda strait, the heaviest rains occur from October to December, or about the same as farther north, but the dry month is July.

In Sunda strait the wet season is during nearly the whole of the north-west monsoon or from November to April.

The rainfall on the west coast of Sumatra differs with the prevailing monsoon. During the north-east monsoon it is generally dry during the day, the rain falling during the early hours of the night, and vessels are mostly outside its limits if at a considerable distance from the shore.

During the south-west monsoon, especially from September to November, inclusive, the sky is overcast both day and night and the weather squally. The rain is violent sometimes for several consecutive days.

The following table gives the months of maximum and minimum rainfall to the year 1904 at the principal ports of Netherlands India embraced by this volume. The number of days increase and decrease to the months quoted, and there is no actually dry season.

Place.	Lat. Approx.	Months in which Maximum Rainfall occurred. Average Number of Days per Month.	Months in which Minimum Rainfall occurred. Average Number of Days per Month.	Total Fall in Inches. No. of Days.
Olehléh (N. coast Sumatra).	5½ N.	Nov.—Dec. 15 15	Mar. 8	66* 135
Singkel (W. coast Sumatra).	2¼ N.	Oct.—Nov. 20 20	Jan.-Feb.-June-July 15 12 13 15	183 195
Siboga (W. coast Sumatra).	1¾ N.	Oct.—Dec. 22 23	June-July-Aug. 12 14 16	186 211
Ayer Bangies (W. coast Sumatra).	—	Oct.—Dec., Apl. 17 16	Feb.—June 9 10	122 164
Padang (W. coast Sumatra).	1 S.	Oct.-Nov.-Dec.-Apl. 17 18 16	Feb.—June 9 10	102 187
Benkulen (W. coast Sumatra).	4 S.	Oct.—Dec. 18 20	July 11	132 181
Telok Betung (Sunda strait).	5½ S.	Dec.—Apl. 16 19	July 9	92 155
Gunung Sitoli (Nias island).	-	Oct.—Nov. 22	Feb. 13	128 213
Java 1st pt. (Sunda strait).	6½ S.	Oct.—Mar. 16 21	Apl.—Sept. 8	137
Palembang (S.E. coast Sumatra).	2½ S.	Oct.—Apl. 19 21	July 8	106 180

* On the islands off the north coast the fall is about double that at Olehléh.

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Place.	Lat. Approx.	Months in which Maximum Rainfall occurred. Average Number of Days per Month.	Months in which Minimum Rainfall occurred. Average Number of Days per Month.	Total Fall in Inches. No. of Days.
	°			
Bengkalis	1½ N.	Apl.-May-Sept.-Dec.	Feb.	104
(Sumatra E. coast).		17 14 16 20	9	173
Medan	4 N.	Aug.—Dec.	Feb.—Mar.	82
(Sumatra E. coast).		15 18	7 9	158
Seruwai	—	Aug.—Jan.	Feb.—Mar.	83
(Tamiang river).		15 11	7 6	150
Edi	5 N.	Oct.—Feb.	Feb.—Apl.	77
(Sumatra E. coast).		14 19	6 7	128
Muntok	2 S.	Nov.—Dec.	July—Sept.	120
(Banka I.).		19 23	8 10	168
Manggar	3 S.	Nov.—Mar.	Aug.—Sept.	100
(Belitung I.).		16 20	6 8	

Chart, 2,640 [3,528].

CURRENTS.—Sumatra north coast, and Malacca strait.—Westward of the Acheh islands, there is a current setting in a westerly direction, often attaining a rate of from 1½ to 2 knots an hour and inclining northward or southward of West by the action of the prevailing monsoon. Between these islands and the Nicobars, during the strength even of the south-west monsoon, there is frequently a current setting in the teeth of the monsoon at the rate of 2 knots an hour.

At the same period, there is said to be a strong current between pulo Weh and lat. 6° 30′ N., setting eastward as far as the meridian of Jambu Ayer; this current is said to continue all the year round, but with less strength during the north-east monsoon. It is to be regarded as a counter current with reference to the westerly current along the Pedir coast from Malacca strait.

Through Malacca strait there is a constant north-westerly set, but near and southward of the Aroa islands, where the strait is considerably narrowed, it is only felt by its action on the tidal streams, decreasing the velocity of the flood stream and almost overcoming it during neaps, and increasing that of the ebb to the same extent.

In the north-west portion, the same effect is produced near the shore on the tidal streams, but out in the middle of the strait it is fairly constant and strongest during the north-east monsoon; it finally makes its way seaward along the Pedir coast and affects the tidal streams there, as above mentioned. The tidal action is not appreciable beyond the distance of about 8 miles off the Pedir coast and about 40 miles off the east coast of Acheh, Langksa, &c.

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Sumatra west coast.—The current on the west coast of Sumatra is mainly influenced by the prevailing wind, but occasionally it has been found to run against the wind. Generally the currents running south-eastward are more frequent and stronger than those in the opposite direction, especially in October, November, and December. They are usually weak and have never been found to exceed 2 knots an hour, and seldom exceed one knot. Within 4 miles of the land there are weak tidal streams, the flood running north-westward and the ebb south-eastward. Chart, 2,640 [3,528].

To the northward of the equator, when the current is setting to the southward betwixt the coast and the islands, it is frequently at the same time running to the northward in the open sea, far outside of them.

To the southward of the equator, when at times the southerly winds blow with considerable strength from June to October, a drain of current is impelled to the northward. Observations are wanted in this portion.

Sunda strait.—There is a south-westerly current setting through Sunda strait nearly all the year round, but much affected by the prevailing wind; its effect on the tidal streams is to retard or overcome the north-easterly or flood stream and to increase the ebb, or south-westerly stream.

In the Java sea the currents are for the most part influenced by the prevailing monsoon, and are generally stronger during the north-west than in the south-east monsoon. They incline to the northward or southward, according to the influence of the currents of Sunda, Banka, and Gaspar straits; for, during the north-east monsoon they run to the eastward, or more southerly, according to the set of those which come from the straits; and in the south-east monsoon they run to the westward or more northerly from a similar cause.

Banka strait is chiefly tidal, but greatly affected by the winds; *see* details in the body of the work.

In Gaspar and Carimata straits the current depends greatly on the strength of the wind. During the strength of either monsoon, the current, when accelerated by the tidal stream, runs from 2 to 3 knots per hour with the wind; when the monsoon is light and the tidal stream is against the wind there is little or no current, and the tidal stream at times overcomes it.

TIDES.—Throughout the Eastern seas, the rise and fall of the tide is largely affected by diurnal inequality.

At **Singapore** and its neighbourhood the general feature of the tides consists of one high and one low water, succeeded by a second high and low water of considerably diminished range, the difference between the heights of this inferior high and low water being reduced sometimes

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to a few inches only; but the difference between two successive low waters is generally greater than the difference between two successive high waters. At certain of the moon's quadratures and in years of large lunar declination, this inferior tide may disappear altogether. At these times there will be only one high and one low water during the day. Special tide tables are published at Singapore. *See* also page 240.

Sumatra.—At Olehléh it is high water full and change at about 10 hours; springs rise about 5 feet. On the north and north-east coasts there is high and low water twice during the 24 hours, and the highest tides occur 2 days after full and change of the moon; the tides are subject to diurnal inequalities. A peculiarity about them is, that from about one to 2 days before, until 5 to 6 days after, full and change, the tide rises to within a few inches of the maximum at springs, so that there are about 15 days in the months in which the water rises to within a foot of its maximum. During the first 6 days of the springs the times of high water only change 30 to 40 minutes per day; during neaps the change is sometimes more than 2 hours per day. The day tides are highest during the month of May, and the night tides during November, the ranges, at neaps, being only from 6 to 12 inches. North-west winds increase and south-east winds lessen the strength of the tidal streams in Malacca Strait.

On the east coast of Sumatra the tides are usually semi-diurnal, with a rise of 4 feet at Segli, increasing to 8 feet at Bengkalis and 12 feet in Rupat strait.

On the west coast of Sumatra there is but little rise and fall, and what there is does not seem to follow any known laws. In the lat. of pulo Raja (about 5° N.) 8 hours may be assumed as the time of high water at full and change, and the rise from 2 to 3 feet. At places near the equator the time is about 6 hours.

Southward of the Rhio and Linga archipelagos to tanjong Kalian the diurnal tides are the most important, but northward of these islands to Singapore, the semi-diurnal tides have the superiority; the relations of both tides amongst these islands is, however, not known with certainty.

For other places and for tidal streams, *see* the body of the work.

UNIFORM SYSTEM OF BUOYAGE.—The following uniform system of buoyage has been adopted, and will be carried out in the fairways of the Netherlands East Indies:—

1. The term starboard hand means that side which would be on the right hand going with the main stream of flood, or in entering a harbour, river, or estuary, from seaward; the term port hand means the left hand side, under the same circumstances.

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2. Conical (nun) buoys are starboard hand buoys as thus defined, and are painted white.
3. Can (truncated) buoys are port hand buoys as thus defined, and are painted black.
4. Spherical buoys mark the ends of middle grounds, and are painted black and red in horizontal stripes. These buoys are always surmounted by top marks; other buoys only in special cases.
5. Buoys lying outside, and marking the approach to, seaward channels are of a special shape, and are painted red and black in vertical stripes.
6. The buoys marking the outer shoals remain as at present.
7. Wrecks are marked by green conical or can buoys, according as the wreck lies on the starboard or port side of the fairway. Should the wreck be in mid channel, it will be marked by a can buoy on one side, and a conical buoy on the other side, which buoys are to be treated as port or starboard hand buoys, according to shape.
8. The top marks are as follows:—

   A diamond marks the outer or seaward side of a bank.

   A cone marks the inner side of a bank.

   A ball marks the starboard side of the fairway.

   A truncated cone marks the port side of the fairway.

   A cross is used as a special mark, and surmounting a spherical buoy indicates that the buoy may be passed on either side.

   The ball and truncated cone are also used as top marks for beacons.

   The top marks are of the same colour as the buoys or beacons on which they are placed.
9. The buoys of sea channels will be numbered consecutively (beginning from seaward), and marked by the first letter of the name of the channel. The numbers and letters will be white.

This uniform system of buoyage will gradually be adopted, as regards the shape of the buoys and top marks, whilst the alteration in colour will only be made when all else has been changed in accordance with the new system. For this reason, it is necessary during the period of transition that attention should be exclusively given to the colour (as has hitherto been the case), and not to the shape of the buoys; the existing colours black and white, remaining temporarily unaltered.

CAUTION.—All floating marks such as light-vessels, buoys and floating beacons being liable to break away or to be out of position, too much dependence should not be placed on any of those mentioned in this work.

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PORT REGULATIONS.—Netherlands India.—Vessels coming from any port outside of Netherlands India are forbidden to communicate with the shore before obtaining permission from the commander of the guard-ship, or in case there is no guard-ship in the road, from the Harbour Master.

Every vessel without a bill of health or with an unsatisfactory bill of health shall be subject to the regulations of quarantine. Every vessel from a foreign port is to be provided with a bill of health countersigned by the Dutch Consular officer at the port of departure. *See* Appendix.

FISHING STAKES.—On most of the banks fronting the shores of Malacca strait, and probably off many parts of the coasts mentioned in this volume, particularly off the mouths of rivers, fishing stakes and enclosures will be met with in depths of 3 to 5 fathoms, and in some cases in greater depths.

These enclosures, known as *seros* and *jermals*, are constructed of trees firmly driven into the banks, and interlaced with branches, &c., and form a considerable danger to vessels navigating at night near the depths mentioned. These enclosures last many years, and to those with local knowledge they are good landmarks for making the river mouths, especially on the east coast of Sumatra, where there are but few objects of recognition.

Chart, 1,188 [3,513].

COAL is obtainable in any quantity at Singapore and Penang, and quantities of over 500 tons are kept at Acheh, Sabang bay (pulo Weh) and Padang, in Sumatra. Small quantities are kept at Tapanuli, Telok Betung, and Palembang, in Sumatra; and at Muntok and Linga; coal is also kept, for various purposes, at Deli and Rhio, but the supply to vessels is uncertain.

DOCK ACCOMMODATION.—There are five graving docks at Singapore, and one at Prye river on the mainland opposite Penang, also a floating dock at Sabang bay, pulo Weh. Patent slips at Singapore and Penang.

The dimensions of these, with information regarding docking, will be found under the descriptions of the several places.

PILOTS.—The statement in certain places in Admiralty Sailing Directions that the employment of pilots is compulsory, does not apply to H.M. Ships-of-War. Experience has shown that but little confidence should be placed in the natives who offer themselves as pilots on the west coast of Sumatra. Men, however, holding licences as pilots for this coast are obtainable at Padang.*

* The terms starboard and port, in French vessels, signify that the ship's head is to be directed to starboard and port, and not the helm. This system is adopted also by Austria, Germany, Greece, Italy, Japan, Norway, Portugal, Russia, Spain, Sweden, and Holland. The words of command, "Steuerbord" (Starboard) and "Backbord" (Port) are the only authorised steering commands of the German pilots.

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PASSAGES. — ADEN TO SINGAPORE. — Full-powered steam route.—Direct round south end of Ceylon and through the strait of Malacca. From April to October, vessels should pass north of Sokotra to avoid the heavy cross seas to the southward of it during the S.W. monsoon. Charts, 1,077 [3,511]; 1,078 [3,512].

Coal can be obtained at Colombo, Point de Galle, Sabang bay, pulo Weh and Penang.

The distances from Aden are:—to Colombo, 2,100 miles; to Penang, 3,370; and to Singapore, 3,605.

Sailing route.—April to October.—S.W. monsoon.—Pass north of Sokotra and thence direct round the south end of Ceylon and across the bay of Bengal, entering the Malacca strait between Great Nicobar island and pulo Rondo. After passing the north-west end of Sumatra the S.W. monsoon will most likely fail, and vessels should keep on the Malayan side of the channel, where a tidal influence prevails and there are less calms. Sometimes a brisk westerly wind will be carried as far as Penang. When once the islands on the Malay coast are sighted, there will be no difficulty in getting to the southward.

For squalls in Malacca strait, during this monsoon, *see* Winds in Malacca strait, page 25.

Auxiliary steam route.—April to October.—As in the sailing route, but steaming through the strait of Malacca.

Sailing route.—October to March.—N.E. monsoon.—Work along the Arabian coast as far as ras Farták, or just beyond it, and thence stand across the Arabian sea, passing on either side of Minikoi island, and round the south end of Ceylon, and across the bay of Bengal. Pass close to the southward of the Great Nicobar island, if the wind permit, and thence keep on the Malay side of the Malacca strait, where there are tidal streams and more favourable winds.

Auxiliary steam route.—October to March.—Steam along the Arabian coast up to ras Farták, thence under sail across the Arabian sea, under steam and fore-and-aft sails across the bay of Bengal, and under steam down the strait of Malacca.

SINGAPORE to ADEN. — Full-powered steam routes.—Direct through the Malacca strait and across the bay of Bengal and Arabian sea, invariably passing northward of Sokotra during the S.W. monsoon, May to September, but in all seasons of the year it is desirable to avoid passing south, if Abd al Kuri is to be made at night, as the currents are often strong to the northward.

If not calling at Ceylon, it would be better, between May and September, after passing the north-west end of Sumatra, to stand to the south-westward till in about 4° S. and 85° E., thence continuing on the

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Charts, 1,077 [3,511]; 1,078 [3,512].

parallel of 4° S. till in about 60° E., when a course may be shaped for ras Hafún; or if coal be required, the Seychelles could be called at, and a course thence steered for ras Hafún. Distance 3,807 miles, but if calling at Mahé, Seychelles, 4,006 miles.

Another route during the S.W. monsoon, and by which much wear and tear would be avoided, is to go through Sunda strait, into the Indian ocean, and thence pass north of the Chagos group but not north of 4° S. till in 60° E., when a course may be shaped for ras Hafún, and thence round ras Asir. Distance 4,712 miles.

Coal can be obtained at the Seychelles, and the distances would be in that case, from Singapore to Seychelles, 3,510 miles; and to Aden, 4,930.

Sail and auxiliary steam routes. — April to September.—Work, or steam, to the southward through Banka and Sunda straits, and thence run across the Indian ocean with the S.E. trade and S.W. monsoon, passing southward of the Chagos group and north-eastward of the Seychelles, crossing the equator in about 53° or 54° E., and making the African coast between ras Hafún and ras Asir. From ras Asir work, or steam, along the north coast of Africa up to Burnt island and thence stand across for Aden.

October to March.—Vessels bound through the Malacca strait usually experience favourable weather and fair winds. Pass on either side of pulo Perak and out into the Indian ocean between Great Nicobar island and pulo Rondo. Thence direct round the south end of Ceylon and through the Nine degree channel. Steam will probably only be required in the Malacca strait and when rounding the south end of Ceylon. Towards the end of the monsoon, after mid-March, vessels should pass to the southward of Sokotra, unless Abd al Kuri is to be made at night.

NAVIGATION OF MALACCA STRAIT.—The navigation of this strait, with ordinary caution, is not dangerous; the channels are mostly spacious, and have good anchorage, but due attention to the set of the currents and tidal streams is requisite. The sailing passage is much facilitated by keeping under way at night, for steady breezes then often prevail, calms and faint airs being experienced during the day; passages are thus made without anchoring more than once or twice. The passage to the north-west is generally made in less time than the one to the south-east. A stream anchor for tidal use will be found convenient in most parts of the strait. Winds in Malacca Strait, *see* page 25.

SINGAPORE TO HONG KONG. — Full-powered steam route.—Follow the main route, which passes eastward of pulo Sapatu and between the Macclesfield bank and the Paracels. Distance 1,440 miles.

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Another route, recommended during the N.E. monsoon for more moderate-powered vessels, is to pass 2 or 3 miles north-westward of the Anamba islands, 5 to 10 miles north-west of pulo Laut (N. Natuna), and 30 miles west of the Prince of Wales bank, and thence direct to 14½° N. and 115½° E., east of the Macclesfield bank, and to Hong Kong. Distance, 1,560 miles. Charts, 1.077 [3,511]; 1,078 [3,512].

Sailing route.—S.W. monsoon.—In March, April, and May the inner or Cochin China route is generally the most expeditious, as the monsoon sets in rather earlier on the western coasts than in the open sea. This route follows the Malay coast from pulo Aor to the Redang islands, crosses the gulf of Siam and follows the coast of Cochin China up to cape Tourane; then crosses the gulf of Tong King, and coasts along the east side of Hainan island, passing inside the Taya islands, and thence direct to Hong Kong. This route should also be taken in the height of the monsoon by a vessel that is weak and making much water.

In June, July, August, and September, the main or direct route should be taken, but this route becomes precarious if the vessel has not arrived in the vicinity of pulo Sapatu early in October; for near this island, about the middle of that month, strong southerly currents begin to prevail with light northerly winds, variable airs, and calms, by which many vessels have been delayed for several days, and have made no progress to the northward.

Auxiliary steam route.—The main route.

Vessels bound to the Canton river make the Great Ladrone island and proceed through the Great Western channel. Those bound to Hong Kong make the same island, or Gap rock light, and pass westward of the Kypong islands, and through the West Lamma channel, but after mid-August they should make the N.E. head of the Lema islands, and enter by the Lema and West Lamma channels.

Sailing route. — N.E. monsoon. — October to February.—The passage by the coasts of Paláwan and Luzon is recommended, but in December, January, and February, vessels should not leave the entrance of Singapore strait in strong N.E. winds, as the current at such times runs to the S.S.E. from 2½ to 3 knots an hour. After these gales the wind generally backs to North and N.W., and the current decreases. The route is to the north-eastward, passing between Great Natuna and the South Natuna islands, thence between the Royal Charlotte and Louisa reefs, through the Paláwan passage and along the coast of Luzon as far as point Piedra, and thence across the China Sea for Hong Kong, passing to leeward of the Pratas shoals.

Should the main route be adopted, vessels after passing the Natuna islands should work to the northward, keeping as close to the western edge of the reefs as possible, where the current is generally favourable, and

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Charts, 1,077 [3,511]; 1,078 [3,512].

having arrived in the large space of open sea to the northward of 12° N., should stand to the eastward and work up the coast of Luzon as far as point Piedra and thence stand across for Hong Kong.

Auxiliary steam route.—Stand over to the Borneo coast and through the Api pass ; thence between the South Luconia shoals and Barram point, keeping as close to the Borneo coast, up to that point, as circumstances will permit; proceed through the Paláwan passage and along the west coast of Luzon as far as Piedra point, and then across to Hong Kong, passing to leeward of the Pratas shoals. Coal can be obtained at Labuan and Manila.

Hong Kong road is generally approached by sailing vessels from the westward. It may be approached from the eastward through the Lyemun pass during the N.E. monsoon, but the winds are generally baffling under the high land, for which reason it is not much used by sailing vessels.

HONG KONG TO SINGAPORE. — Full-powered steam routes.—April to September.—Pass about 30 miles westward of the Paracels, make the coast of Cochin China in the vicinity of Kulao Rai, and keep along the coast, about 3 miles distant, as far as Cape Padaran. Thence pass about 3 miles eastward of pulo Aor to Singapore. During thick weather it is advisable to pass eastward of pulo Sapatu.

N.E. monsoon.—October to March.—Pass about 30 miles westward of the Paracels; 15 to 20 miles east of cape Varella, and eastward of pulo Sapatu and pulo Aor to Singapore. Distance in both cases, 1,440 miles.

Sailing route.—S.W. monsoon.—May to September.—After leaving Hong Kong, the usual practice is to stand towards Hainan island, which will often be fetched without tacking as the wind frequently blows for days together from the south-east or eastward in that part of the China sea; thence across the gulf of Tong-King to the Cochin China coast and down that coast, with the land and sea breezes which generally prevail there, as far as cape Varella, or, if possible, cape Padaran; thence stretch off to the southward, making a tack, if necessary, to weather the West London reefs, till the coast of Borneo is reached.

Working along the coast of Borneo and through any of the South Natuna channels, stand across to Singapore, keeping well to the southward before closing Bintang island so as to allow for the current which runs very strongly, sometimes 2 knots an hour, to the northward.

In March and April vessels should take the main route, keeping to the eastward on leaving the China coast; and also in passing pulo Sapatu they should borrow to the eastward towards the shoals, where the winds are more favourable than farther to the westward. The Paláwan route may also be taken in these months.

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Auxiliary steam route.—March to September.—The main route should be taken in March and April—the inner route afterwards. Charts, 1,077 [3,511]; 1,078 [3,512].

Sail and auxiliary steam route.—N.E. monsoon.—October to February.—As in the full-powered steam route—passing westward of the Paracels, and eastward of pulo Sapatu and pulo Aor to Singapore.

ENGLAND TO CHINA, ROUND THE CAPE OF GOOD HOPE.—Full-powered steam route.—Follow the route to the Cape of Good Hope, and thence keep along shore out of the strength of the Agulhas current, but avoiding all salient points, as far as Algoa bay.

From Algoa bay follow the great circle route to Sunda strait (the great circle from cape Recife to Java head passes just south of the Cocos or Keeling islands), and thence pass through the Gaspar strait and east of the Anamba islands, and take the main route up the China sea. If calling at Singapore, from Sunda strait pass through the Banka and Rhio straits to Singapore and thence take the main route.

The coaling stations are, Las Palmas, Sierra Leone, Cape of Good Hope, port Elizabeth (Algoa bay), Batavia, and Singapore.

The distances from Plymouth are:—Las Palmas, 1,410 miles; Sierra Leone, 2,700; Cape of Good Hope, 5,840; port Elizabeth, 6,230; Sunda strait, 10,850; Batavia, 11,000; Singapore, 11,440; and to Hong Kong, 12,720 miles, but 60 more to Hong Kong if calling at Batavia, and about 170 more if calling at Singapore.

If calling at Mauritius, the distances to Sunda strait, and places beyond, would be increased by about 140 miles.

Sailing routes.—Follow the route to the Cape of Good Hope until beyond the S.E. trade, and thence on the great circle track to cross 20° E. in 39° to 40° S., afterwards keeping between those parallels till up to St. Paul island or to about 80° E.

After passing St. Paul island, from April to September, edge off to the north-east and cross 30° S. in about 100° E., and 20° S. in about 105° E., and pass close to the westward of Christmas island to Java head, but care must be taken to keep well to the eastward, especially in June, July, and August, when the S.E. monsoon is at its strongest, or otherwise the vessel will fall to leeward of Java head, where the wind sometimes backs to East or E.N.E. and the current sets strongly to the westward, and will experience difficulty in making Sunda strait.

From Sunda strait proceed through Banka strait and to the northward, passing between the Anamba and Natuna islands, into the China sea.

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Charts, 1,077 [3,511]; 1,078 [3,512].

Thence proceed direct between the Paracels and the Macclesfield bank to Hong Kong.

The Gaspar strait is more direct than the Banka strait to the China sea, and is frequently used, but in thick weather Banka strait can be taken without risk, whilst Gaspar strait can never be approached at such times without incurring considerable danger.

From October to April, after passing St. Paul island, cross 30° S. in about 95° E., and thence stand direct to Sunda strait, taking care to pass well to the westward of Java head, as westerly winds blow with great violence along the south coast of Java; but if contrary winds are met with after passing St. Paul island, stand at once to the northward through the S.E. trade into the N.W. monsoon, and thence direct to Sunda strait.

During the change of monsoons (mid-March to mid-April and mid-September to mid-October) when the winds are variable and uncertain, it is advisable to make sufficient easting in the S.E. trade to bring Java head to bear North, and then to steer direct for it.

If calling at Singapore, from Sunda strait work to the northward through Banka and Rhio straits to Singapore, and thence up the China sea by the Paláwan route. When the N.E. monsoon is blowing strong in the China sea, vessels may proceed through Berhala and Durian straits to Singapore instead of beating about outside against a heavy sea and an adverse current to Rhio strait. This is a very tedious passage, and a vessel has been known to take 30 days from Sunda strait to Singapore, a distance of only 500 miles.

If not calling at Singapore, vessels should take one of the eastern passages to China.

The following observations should be taken into consideration when making the passage at this season :—

If St. Paul island be passed after the end of September when the N.E. moonson will be met with before Hong Kong is reached, or if bound north of Hong Kong at this season of the year, there are five routes open; and the advantages and disadvantages of each should be duly weighed in making a choice as to which is the most advisable to follow.

1. Vessels may proceed through Sunda strait, Gaspar strait, and by the Paláwan passage.

2. Vessels may proceed by Sunda strait, through the Java sea, Makassar strait, Celebes sea, and Verde island passage, and up the coast of Luzon, but this is not recommended as Makassar strait is full of shoals and badly surveyed.

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3. Vessels may pass through Sunda strait, Salayar strait, Pitt passage, and into the Pacific by Gillolo or Dampier strait. Charts, 1,077 [3,511] : 1,078 [3,512].

4. Vessels may pass through Ombai passage, across the Flores sea, and through Manipa strait into Pitt passage, and out into the Pacific.

5. Vessels may go round south of Australia or Tasmania and proceed towards China and Japan on the east side of Australia and through the passage between the Solomon islands and New Britain.

With regard to No. 1 route it will be observed that the N.E. monsoon does not usually commence in the southern part of the China sea until the first week in November. Vessels therefore, which get through Sunda and Carimata straits before that time, may adopt this route with advantage; but if adverse winds are met in Carimata strait, routes 2 or 3 should be at once adopted, and preferably route 3.

If passing St. Paul island after November, take routes 4 or 5.

Leaving Sunda strait in October and November, vessels may take the First Eastern passage, viz:—south of Borneo, through the Makassar strait and Celebes sea, and into the Sulu sea by the Basilan strait; then along the west coasts of Mindinao, Negros, and Panay islands, and into the China sea by Mindoro strait or Verde island passage.

From this work along the coast of Luzon as far as cape Bolinao (point Piedra) or even to cape Bojeador, and thence stand across the China sea, passing to leeward of the Pratas shoals, and entering Hong Kong by the Lema and West Lamma channels. This route is not recommended, however, as the Makassar strait is full of shoals, and badly surveyed.

Bound to northern China, or Japan, vessels should enter the Pacific between Mindanao and Celebes and pass eastward of Formosa island.

Leaving Sunda strait in the latter half of November, and in December, January, and February, vessels should take the Second Eastern passage, viz.:—South of Borneo, through Salayar strait (between S.W. end of Celebes and Salayar island), south of Buton island, through Pitt passage, and into the Pacific ocean by Gillolo or Dampier strait; after which, making easting between $1\frac{1}{2}°$ N. and 3° N., till able to pass east of the Pelew islands, when stand to the northward and enter the China sea between Formosa and Luzon, by either the Bashi or Balingtang channel, and thence steer direct for Hong Kong. After February pass westward of the Pelew islands. A smart sailing vessel could pass west of the Pelew islands before February.

Bound to northern China or Japan, pass east of Formosa.

Vessels taking the First Eastern passage may enter the Java sea by Bali, Lombok, or Alas strait, instead of by Sunda strait, and thence through Makassar strait, &c.

Those taking the Second Eastern passage may enter the Flores sea by the Ombai pass. These should, after passing St. Paul island, enter the

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Charts, 1,077 [3,511]; 1,078 [3,512].

S.E. trade in about 110° E., and after passing N.W. cape (in Australia) steer direct for and through the Ombai pass, across the Flores sea, and through Manipa strait into Pitt passage, &c.

There is another route, round Australia, known as the **Great Eastern route,** which has been taken with great success by vessels passing the Cape of Good Hope in September. From the Cape keep between the parallels of 39° and 40° S. as far as the meridian of cape Leeuwin, and thence proceed through Bass strait or south of Tasmania. Thence stand to the north-east, and pass west of New Caledonia and between the Solomon islands and New Britain, and cross the equator in about 156° E. Thence as direct as possible. There is, however, a possibility of meeting a cyclonic storm in this track before crossing the equator.

Auxiliary steam routes.—As in the routes to the Cape of Good Hope, and thence as in the sailing route to Sunda strait, on page .

But from **October to February,** instead of taking either of the eastern passages to Hong Kong from Sunda strait, vessels should steam through Banka or Gaspar strait, and across to the Borneo coast and thence follow the Palawan route to Hong Kong. Coal can be obtained at Labúan and Manila.

HONG KONG TO ENGLAND ROUND THE CAPE OF GOOD HOPE.—Full-powered steam route.—Direct down the China sea, passing west of the Paracels and the Anambas, if calling at Singapore, and thence through Rhio and Banka straits to Sunda strait.

If not calling at Singapore, pass east of the Paracels and Great Natuna island, and through Gaspar strait to Sunda strait.

From Sunda strait follow the rhumb-line course across the southern Indian ocean to make the African coast about 200 miles southward f Natal, and keeping in the strength of the Agulhas current to abreast Mossel bay, proceed direct round cape Agulhas.

From the Cape of Good Hope the route is the reverse of the outward route.

The coaling stations on or near the route are Singapore, Batavia, Mauritius, port Elizabeth (Algoa bay), Cape of Good Hope, Sierra Leone, and Las Palmas.

The distances from Hong Kong are :—to Sunda strait, 1,780 miles; Cape of Good Hope, 6,850 miles; and Plymouth, 12,790 miles.

Sailing routes.—S.W. monsoon.—In March and April and the early part of May stand over to the coast of Luzon and proceed through the Palawan passage, along the coast of Borneo, through the Api pass, round Serutu island and through the Carimata strait, and thence close round the North Watcher to Sunda strait. By this route

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vessels are likely to carry easterly winds and fine weather with a smooth sea the whole distance, and will avoid calms. Charts, 1,077 [3,511]; 1,078 [3,512].

Leaving at the end of April, another route is to stand towards the Macclesfield bank, and thence follow the First Eastern passage, viz.:—Through Mindoro strait, along the coast of Panay, through Basilan strait, the Celebes sea, and the Makassar strait to the strait of Sunda—or through the Malucco passage if entering the Indian ocean by one of the channels eastward of Java (Alas, Lombok, or Bali straits). If taking the Makassar strait, it must be remembered that it is very imperfectly surveyed.

From mid-May to the end of July a vessel should stand across the China sea and enter the Pacific by the Balingtang channel and stand to the south-eastward, tacking if necessary, so as not to round the Pelew islands too far to the eastward, and thence make southing and pass through either Gillolo or Dampier strait into Pitt passage, and thence through Manipa strait, across the Banda sea, and into the Indian ocean by the Ombai pass.

In August a vessel should stand toward Hainan island and cross the gulf of Tong-King and work down the Cochin China coast, with the land and sea breezes, as far as cape Varella or cape Padaran. Thence cross to the coast of Borneo, tacking if necessary to weather the West London or other reefs, and work along that coast and pass through the Carimata or Gaspar strait to the strait of Sunda.

N.E. monsoon.—October to February.—Pass west of the Paracels, east of pulo Sapatu, between the Anamba and Natuna islands, and through Banka or Gaspar strait to the strait of Sunda.

From **May to October**, when in the Indian ocean, shape a course to pass about 100 miles southward of Madagascar and make the African coast about 200 miles southward of Natal, and keep in the strength of the Agulhas current until abreast of Mossel bay, when proceed direct round cape Agulhas; but with westerly winds, after passing Algoa bay, keep on the Agulhas bank, not more than 40 or 50 miles from the shore, where the sea will be smoother than off the bank in the strength of the Agulhas current.

From **November to April,** during the N.W. monsoon, from the strait of Sunda, or any of the straits eastward of it, stand to the southward into the S.E. trade and afterwards proceed as above, remembering that this is the cyclone season in the southern hemisphere.

When round the Cape of Good Hope run through the S.E. trade, passing east of St. Helena, on either side of Ascension, and crossing the equator in about 25° W. Thence work to the northward into the N.E. trade, run through it, and when in the westerly winds shape a course for the English channel.

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Charts, 1,077 [3,511]; 1,078 [3,512].

Auxiliary steam routes.—March to September.—The main route down the China sea should be taken in March and April—the Inner route afterwards—calling at Singapore for coal. Thence through Gaspar or Banka strait to Sunda strait.

October to February.—N.E. monsoon.—As in the sailing route.

From Sunda strait to England the route is the same as the sailing route, using steam through light head winds and calms.

SINGAPORE TO BANGKOK.—Full-powered steam vessels.—Direct at all seasons. Distance 830 miles.

Sailing and auxiliary steam routes.—S.W. monsoon. —April to September.—When clear of Singapore strait, keep along the western shore of the gulf of Siam.

N.E. monsoon.—October to March.—Singapore strait should not be left in strong north-easterly winds; when they are over, the wind generally backs to north and north-west. Then stand to the north-eastward, passing between the Great and South Natuna islands (fast sailing vessels pass between the Anamba and Natuna islands) to about 111° or 112° E., and stand towards pulo Obi and up the gulf of Siam. Auxiliary steam vessels also follow this route during the height of the monsoon, in December and January; during the remainder of the monsoon they go direct.

BANGKOK TO SINGAPORE.—Full-powered steam route.—Direct.

Sail and auxiliary steam routes.—S.W. monsoon.— April to September.—Keep along the western shore of the gulf of Siam, passing inside the Redang islands, pulo Kapas and pulo Brala.

N.E. monsoon.—October to March.—Keep along the eastern side of the gulf of Siam as far as pulo Panjang, and outside pulo Aor to Singapore strait.

SINGAPORE TO SAIGON.—Full-powered steam route.—Direct in both monsoons. Distance 600 miles.

Sailing route.—S.W. monsoon.—April to September. —Pass to the westward of pulo Condore, allowing for a current setting out of the gulf of Siam, and thence make for the edge of the bank fronting the mouths of the Cambodia river, and keep along it in 8 to 12 fathoms water up to the river Saigon. Strong freshets set

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out of the rivers in this monsoon, rendering it necessary that these depths should be preserved, the lead being kept constantly going, or the vessel will be set to leeward. Charts, 1,077 [3,511]; 1,078 [3,512].

N.E. monsoon.—October to March.—As when bound to Bangkok or China, do not leave Singapore strait when strong N.E. winds are blowing, but wait till they are over and the wind has backed to north or north-west, when stand to the north-eastward as far as about 112° E., and thence to make cape Ti wan, about 12 miles eastward of the entrance to Saigon river.

N.N.E. and N.E. gales often blow in the latitude of pulo Saputu and between it and the Cochin China coast in December, January, and February. Good shelter will be found in pulo Condore harbour.

Auxiliary steam routes.—Direct, except during the strength of the N.E. monsoon, in December and January, when the sailing route should be followed.

SAIGON TO SINGAPORE.—Full-powered steam route.—Direct.

Sailing routes.—S.W. monsoon.—April to September.—Steer to the south-westward until the regular monsoon is met with and then stand to the south-eastward, and when beyond the Great Natuna island a fast sailing vessel may fetch Singapore strait by passing just northward of the South Natuna islands. Dull sailing vessels should pass through the Api passage, and keep along the Borneo coast as far as the Burong islands before standing across for Singapore.

N.E. monsoon.—October to March.—Pass eastward of pulo Condore, and thence direct.

Auxiliary steam routes.—S.W. monsoon.—Keep along the coast as far as the Brothers, or pulo Obi, then crossing to the Malay coast, and passing inside pulo Tioman and the Sibu islands, keep along the coast to Singapore strait.

N.E. monsoon.—As in sailing route.

SINGAPORE TO MANILA.—Full-powered steam routes.—S.W. monsoon.—March to September.—Follow the main route up the China sea till beyond 12° N., and thence direct for Manila.

N.E. monsoon.—October to February.—Take the Paláwan passage.

The distance is about the same by either route, viz. 1,370 miles.

During both monsoons the Paláwan route offers the advantage of freedom from typhoons.

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Charts, 1,077 [3,511]; 1,078 [3,512].

Sail and auxiliary steam routes.—S.W. monsoon.—March to September.—As in the full-powered steam route, but until May keeping more towards the Cochin China coast as the monsoon sets in earlier on the western coasts than in the open sea.

N.E. monsoon.—October to February.—Take the Palawan passage, as when bound to Hong Kong.

MANILA TO SINGAPORE.—Full-powered steam routes.—There are two routes as in the reverse passage. During the N.E. monsoon, stand across the China sea, not going to the southward of 12° N. till past 114° E., and then follow the main route down the China sea.

During the S.W. monsoon, by taking the Paláwan passage, vessels will avoid the strong adverse currents of the China sea.

Sail and auxiliary steam routes.—N.E. monsoon.—October to April.—Through the Paláwan passage and afterwards as direct as possible.

S.W. monsoon.—May to September.—Through the Palawan passage and along the coast of Borneo as far as the Burong islands before crossing over to Singapore.

SINGAPORE TO PORT DARWIN.—Full-powered steam routes.—Through Carimata and Sapudi straits and thence along the parallel of 8° S. until north of Ombai island, when proceed through Wetta passage and round the north-east end of Timor and direct. Distance, 1,900 miles.

An alternative route during the N.W. monsoon, from November to March, is, when through the Carimata strait, to make for the south end of Celebes, pass through the Salayar strait, and thence across the Flores sea for the Wetta passage and as above.

Sail and auxiliary steam route.—N.W. monsoon—November to March.—Through Carimata and Sapudi straits and into the Indian ocean by Lombok or Alas straits, and thence direct.

S.E. monsoon.—April to September.—Cross the China sea passing south of the Great Natunas and between the Royal Charlotte and Louisa banks; thence pass through the Balábac strait, cross the Sulu and Celebes seas, pass through the Molucca channel, across Pitt passage and through Manipa strait. Thence pass east of Turtle and Damma islands, and between Sermattan and Baba islands and direct.

Between the monsoons, **auxiliary steamers** should follow the full-powered steam route.

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PORT DARWIN TO SINGAPORE.—Full-powered steam routes.—N.W. monsoon.—November to March.— Round the north-east end of Timor island, pass through Wetta channel, and along the parallel of 8° S. as far as Lombok; thence through Sapudi and Carimata straits to Singapore. Charts, 1,077 [3,511]; 1,078 [3,512].

S.E. monsoon.—April to October.—Pass to the southward of Timor and Sandalwood islands, and through Alas, Sapudi, and Carimata straits.

Sail and auxiliary steam routes.—N.W. monsoon.—Stand to the northward and pass through Manipa strait and the Molucca or Gillolo channels; thence across the Celebes and Sulu seas and through the Balábac strait into the China sea to Singapore.

An **auxiliary steam vessel** might instead follow the full-powered steam route, coaling at Surabaya, if necessary, but steam would be required the whole way.

S.E. monsoon.—The same as the full-powered steam route at this season.

SINGAPORE TO SYDNEY.—Full-powered steam route.—Through Carimata and Sapudi straits and along the parallel of 8° S. until north of Ombai island, when proceed through Wetta passage and direct for Torres strait. From Torres strait follow the Inner route along the coast of Australia. Distance, 4,300 miles.

Near the line of route, coal can be obtained at Koepang on the S.W. end of Timor island, at Amboina, and perhaps at Thursday island and Cooktown.

During the N.W. monsoon, November to March, another route is after leaving Carimata strait, to steer for the south end of Celebes island, pass through the Salayar strait, cross the Flores sea to the Wetta passage, and then proceed as above.

Another route at any time of the year, if not required to call at east Australian ports, is to proceed through Banka and Sunda straits and direct round the south coast of Australia and through Bass strait. Coal can be obtained at the following places, and the distances to them from Singapore are:—Batavia, 500 miles; King George sound, 2,470; Port Adelaide, 3,510; Melbourne, 3,820; and Sydney, 4,350 miles.

Sail and auxiliary steam route.—S.E. monsoon.—April to October.—Work, or steam, through Rhio and Banka straits to Sunda strait. From Sunda strait run through the S.E. trade into the westerly winds and thence proceed to the southward of Australia and through Bass strait. In making for Bass strait great care is necessary to

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Charts, 1,077 [3,511]; 1,078 [3,512].

prevent being set on to King island by the uncertain strength of the current—vessels should make Moonlight head, or some point of the coast even more to the westward, to make sure of their position, before shaping a course through Bass strait.

When through Bass strait steer to pass about 60 miles off cape Howe and then along the coast outside the strength of the southerly current.

By this route vessels also go when bound to Swan river or to the south Australian ports.

Sailing routes. — N.W. monsoon. — November to March.—Variable winds from North, North-east, and North-west will be experienced until to the southward of Banka or Belitung islands, and vessels should proceed through Banka or Carimata straits and through Sapudi and Bali straits into the Indian ocean. Then run through the N.W. monsoon, keeping well to the westward off the Australian coast, and through the S.E. trade into the westerly winds, and proceed round the south end of Tasmania, to avoid the easterly winds which prevail at this season along the south coast of Australia.

Vessels leaving Singapore between mid-November and mid-February could enter the Indian ocean by Alas strait and proceed for and through Torres strait. Vessels should leave Torres strait by Raine island entrance, or preferably by the Great N.E. channel, and afterwards take every advantage of westerly winds to make easting and endeavour to reach to about 15° S. and 156° E., going as much as practicable over the frequented routes shown in the chart.

With the S.E. trade a vessel should pass, if the wind permit, between Keen and Wreck reefs on the east side, and Frederick and Saumerez reefs on the west—otherwise to leeward of the two latter—and from Sandy cape keep the land in sight so as to profit by the southerly current.

Auxiliary steam route.—N.W. monsoon.—As in the sailing route as far as Torres strait and afterwards through the Inner route inside the Great Barrier reefs—or the full-powered stream route could be followed the whole way.

SYDNEY TO SINGAPORE.—Full-powered steam route.—Follow the Inner route to Torres strait, and proceed to the north-east end of Timor island, through the Wetta channel, and along the parallel of 8° S. as far as Lombok island, and through Sapudi and Carimata straits to Singapore. Distance, 4,160 miles.

If not calling at any of the east Australian ports, an alternative route is through Bass strait, round cape Leeuwin, and through Sunda strait, the distance being about the same.

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Sail and auxiliary steam route.— S.E. monsoon.— March to September.—Follow the Inner route to Torres strait and pass to the southward of Timor and Sandalwood islands, so as to keep in the strength of the monsoon, and through Alas, Sapudi, and Carimata straits to Singapore. Charts, 1,077 [3,511]; 1,078 [3,512].

An auxiliary steam vessel may follow the full-powered steam route from Torres strait instead of the above.

Sailing route. — N. W. monsoon. — November to February.—Stand to the northward and pass eastward of New Guinea to about 5° N., near which north-easterly winds will be found. Proceed south of Mindanao island, through Basilan strait, across the Sula sea, and into the China sea by the Balábac strait direct to Singapore.

An alternative route is to follow the Middle route to Hong Kong as far as the China sea, and thence the main route down the China sea to Singapore.

Auxiliary steam route.—Through Bass strait, along the south coast of Australia, calling at King George sound for coal, if necessary, and then round cape Leeuwin and through Sunda strait. This is the season for easterly winds on the south coast of Australia, but the route is not recommended for sailing vessels on account of the difficulty experienced between Sunda strait and Singapore.

MALACCA STRAIT TO BENGAL.—Full-powered steam route.—Direct, through Preparis south channel.

Sail and auxiliary steam routes, October to March.—Up to mid-January pass east of the Andaman islands. After mid-January pass south of the Andamans, or through Duncan passage, and work, or steam, to the northward in the middle of the bay of Bengal, as north-west and westerly winds are then found north of the Andamans.

April to September.—Pass to the southward of the Nicobars and direct for the Orissa coast.

BENGAL TO MALACCA STRAIT.—Full-powered steam route.—Direct, through Preparis south channel. Distance to Penang 1,310 miles. Coal can be obtained at port Blair, Andaman islands, 810 miles from Calcutta.

Sail and auxiliary steam routes, September to May.—Through Preparis north or south channel and direct.

March to September.—Direct through Preparis south channel.

MALACCA STRAIT TO CEYLON AND COROMANDEL COAST.—Full-powered steam routes.—Direct.

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Charts, 1,077 [3,511]; 1,078 [3,512].

Sail and auxiliary steam routes.—October to March.—For the Coromandel coast keep along the Malay coast up to Salang island and through the Sombrero or Ten-degree channel, making the land to the northward until February. **To Ceylon,** proceed direct, but if westerly winds are found off Acheh head, which is probable in October and November, keep more to the northward.

April to September.—Keep along the north coast of Sumatra, pass through the Bengal passage, and work, or steam, across the bay, but in the height of the S.W. monsoon (in June, July, and August) and also when bound to Ceylon, from a good berth off Acheh head cross the equator and make westing in the S.E. trade and recross the equator in about 83° E. **For Colombo,** recross the equator in about 77° E.

CEYLON AND COROMANDEL COAST TO MALACCA STRAIT.—Full-powered steam route.—Direct. Distances:—Madras to Penang, 1,280 miles; Trincomali to Penang, 1,150 miles. Coal can be obtained at Sabang bay, pulo Weh.

Sail and auxiliary steam route.—October to March.—Direct.

April to October.—Pass to the southward of the Great Nicobar and through the Bengal passage.

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CHAPTER II.

MALACCA STRAIT AND ITS NORTHERN APPROACH.— SUMATRA OR WESTERN SHORE.

ISLANDS OFF NORTH COAST OF SUMATRA.— PULO RONDO, or Tepurong, is the northern of the islands lying off Acheh head, the north-west point of Sumatra, and the west side of the northern approach to Malacca strait. The island is 426 feet above high water, dark coloured, 2½ cables in length, "steep-to" on its northern side, and about 30 miles off shore; rocky islets, from 75 to 150 feet above high water, lie on a reef, composed of rocks and coral, which extends to the distance of one mile from its southern side.

Chart, 219 [2,512]. Lat. 6° 4′ N. Long. 95° 9′ E. Var. 1° E.

Depths of about 100 fathoms are found at a short distance from the island and rocks.

Anchorage.—Temporary anchorage may be obtained on its western side in 8 fathoms water, with the extremes of the island bearing E. by S. and N.E. ¼ N.; but occasionally the heavy surf renders anchoring or landing dangerous.

PULO BRAS or LAMPUJANG, situated about 20 miles southward of pulo Rondo, is the westernmost of the islands off Acheh head; it is 8½ miles in length, in a north-west and south-east direction, 6 miles in breadth at its south end, and attains in mount Chumo, about the middle of the island, a height of 2,296 feet above high water.

The coast generally is steep and craggy from the sea, but in a few places ledges and rocks extend a quarter of a mile off shore, there are sandy beaches within the bays and along almost all the south coast.

LIGHTS.—At Willemstoren, the north point of pulo Bras, a cylindrical tower, 147 feet in height, painted white to a height of 98 feet and red the remainder, exhibits at an elevation of 525 feet above high water, a *white revolving* light with a period of revolution of *one minute*, showing light *nine seconds* followed by an eclipse of *fifty-one seconds;* but in 1904 the period was reported to be irregular.

Lat. 5° 44½′ N. Long. 95° 5½′ E.

The light is visible between the bearings of N. 83° E. (through south and west) and N. 49° W., and, in clear weather, from a distance of 30 miles; within a distance of 12 miles a faint continuous light is seen. North-eastward of pulo Weh the light is obscured by that island. The light keeper's dwelling, built of stone and painted white, stands near the lighthouse.

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Chart, 219 [2,512]. Lat. 5° 44½′ N. Long. 95° 5½′ E. No variation.

From the same tower, at a height of 26 feet above the ground and 433 feet above high water, a *red fixed* light is exhibited, which is visible between the bearings of S. 14° E. and N. 83° E., its central part passing over North-west islet; the light is intended to warn vessels of their approach to this islet, and, in clear weather, should be visible from a distance of 8 miles.

Villages.—On the south side, where there is a comparatively large plain, there are many villages surrounded by cocoanut trees and sugar plantations. In the north-west part there are small pepper plantations. The population is sparse.

Anchorage.—Depths of 15 to 20 fathoms, over sand, will be found within about one mile of pulo Bras, where vessels may find temporary anchorage during fine weather, but the bottom is foul in most places, being chiefly coral or rock; in the bays the bottom is chiefly sand.

Islets and rocks.—North-west islet, bearing N.W. by W. $\frac{7}{8}$ W. distant $5\frac{3}{4}$ miles from Willemstoren lighthouse, is a small rocky, overgrown islet 25 feet above high water, and surrounded by a narrow reef of rocks.

Three small rocky islets lie off the north coast of pulo Bras; the two western islets, close together, are situated with Willemstoren lighthouse bearing E. $\frac{1}{4}$ S. distant $2\frac{3}{4}$ miles, and S.E. by E. $\frac{3}{8}$ E. $1\frac{1}{2}$ miles respectively; the sea breaks on these islets even in moderate weather.

A sunken rock lies 3 cables off the point situated $1\frac{3}{4}$ miles westward of the lighthouse, and another the same distance off-shore 6 cables westward of the lighthouse.

There is a passage between North-west islet and the inner islets, but it is recommended to pass outside them all.

Fleurs rock, small and having a depth of about 6 feet over it, lies about $1\frac{3}{4}$ miles N.W. by W. $\frac{3}{8}$ W. from the west point of pulo Bras, and nearly in line with the two small islets off the north point of that island. The water in the vicinity of Fleurs rock is discoloured, and breaks when there is any wind.

Plan, 219 [2,512]. Lat. 5° 43½′ N. Long. 95° 6′ E.

Lambaleh bay, on the north-east side of pulo Bras, is nearly $1\frac{1}{2}$ miles wide between its entrance points, with from 19 to 20 fathoms water on a line joining them, thence shoaling gradually to the shore. Ujong Punir, the north entrance point, is precipitous, with a depth of 19 fathoms close-to.

About half a mile westward of ujong Punir is a sandy beach, and some buildings of a former Dutch settlement remain in the north-west part of the bay.

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Anchorage.—Good anchorage may be obtained during the south-west monsoon, and although squalls from the hills are sometimes violent, the water is smooth, but a considerable sea sets in during the north-east monsoon, when it is advisable to have two anchors down. Plan, 219 [2,512]. No variation.

Steam vessels usually anchor in 7 fathoms water under ujong Punir, with ujong Bahu (pulo Weh) in line with it, bearing about N.E. ½ N. Sailing vessels anchor in a depth of 10 fathoms with ujong Punir in line with Rondo, about N. ½ E.

Tides.—*See* Tides:—North coast of Acheh, page 36.

Currents.—A strong current usually sets northward past ujong Punir.

North-east coast.—The north-east coast of pulo Bras from Lambaleh bay to Lampujang, the south-eastern point of the island, is rocky; Lampujang village is situated a little northward of the point.

Balken and Sand bays are situated on the west side of pulo Bras, being only separated by a high point. The beaches in these bays are sandy; on the shore of Balken bay there is a large village named Melingie, and on the south-eastern side of Sand bay a rocky point 200 feet above high water. Plan, 219 [2,512]. Lat. 5° 43¼′ N. Long. 95° 4½′ E.

Pulo Sidom or Pylmer are two rocks lying close together on the north side of entrance to Balken bay; close south-westward of them are two sunken rocks on which the sea breaks. Merdu peak, a conspicuous dome-shaped peak, in pulo Weh, seen through the valley behind Sand bay (the southern part of Balken bay), bearing about E. by N. ⅜ N., leads into Balken bay, 2 cables southward of these dangers.

Anchorage.—Both bays afford anchorage during the north-east monsoon, in depths of from 8 to 9 fathoms, over fine sand, but in the south-west monsoon there is considerable swell and sea.

Coast.—The coast of pulo Bras, between Balken and Lambaru bays, has not yet been satisfactorily examined. Chart 219 [2,512].

Lambaru bay, southward of Balken bay, affords anchorage in from 6 to 8 fathoms water, during the north-east monsoon, about a cable off the shore. A good position, in a depth of 9 fathoms, is with the north-west point of the bay bearing W.N.W. and the south point S. by W. These bays are not available during the south-west monsoon.

Pulo U, a rocky islet off the north point of the bay, has a rock about 2 cables north-west of it on which the sea always breaks.

Reef.—A reef extends off Serapong point, the south-western extreme of pulo Bras.

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Chart, 219 [2,512]. No variation. Lat. 5° 39′ N. Long. 95° 7′ E.

Kwala Seranbuang is the mouth of the small stream on the southern side of the island, a reef extends off it; and Oleh Paja village is situated here.

Tuan Dipat, an islet connected to the shore by a reef, and used as a burial place, is situated about $1\frac{1}{2}$ miles eastward of Kwala Seranbuang; Palu village is on pulo Bras abreast the islet.

Anchorage.—Good open anchorage may be obtained westward of the islet, and landing is easily effected.

Pulo Nasi Kechil (Kersik) lies about three-quarters of a mile off the south-west end of pulo Bras, is about 2 miles in length, lofty and overgrown with brushwood, and has a small village on its north-east side. The north coast is rocky and steep, the south and east coasts are sandy beaches. A sandbank, dry at low water, extends half a mile off the north-east point, and just northward of the west extreme is a sunken rock.

Arus Kersik, the passage between pulo Bras and pulo Nasi Kechil, has a fairway depth of 6 to 14 fathoms over half a mile in width, and is navigable, but the tidal streams are strong.

Pulo Gepon is a barren rock half a mile southward of pulo Nasi Kechil; with other rocks above water and "steep-to" southward of it.

Plan, 219 [2,512]. Lat. 5° 39½′ N. Long. 95° 10½′ E.

PULO NASI BESAR or Dedap nearly joins the south-east point of pulo Bras, being separated by Lampujang strait, a rocky channel $1\frac{1}{2}$ cables in breadth, in which there is a depth of 12 fathoms, but a reef, with depths of from $2\frac{1}{2}$ to 7 fathoms over it, extends nearly $2\frac{1}{2}$ cables in a north-west direction from the north-west point of pulo Nasi Besar, having $3\frac{1}{2}$ fathoms water near its end. At $4\frac{4}{10}$ cables, W. by S. $\frac{1}{2}$ S., from the southern point of pulo Bras, is the south-eastern extremity of a ridge, $\frac{4}{10}$ of a cable in width, on which the least known depth is $2\frac{1}{2}$ fathoms and which, from this position, extends $4\frac{4}{10}$ cables in a north-westerly direction. The tidal streams run with considerable strength in this channel.

Pulo Nasi Besar is triangular in shape, and about 4 miles in length and $4\frac{1}{2}$ in breadth on its southern side.

The coast line is rocky in places, and in others, chiefly on the west side, there are sandy beaches. The water is fairly deep all round, the 5-fathoms contour line being within 3 cables of the coast. There is an isolated rock in Rots bay, and two in Cedar passage, southward of the island.

Inhabitants.—The island is fairly thickly populated, the inhabitants being for the most part engaged in the cultivation of pepper.

Anchorages.—There is temporary anchorage, in from 6 to 10 fathoms water, in the bay on the south side of pulo Nasi Besar about

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1¼ miles eastward of the south-west point. Fresh water and firewood may be procured on the west side of the bay. Chart, 219 [2,512]. No variation.

In Pasijaning bay, on the west side, during the north-east monsoon, there is good anchorage in depths of from 7 to 8 fathoms, over fine sand, but it is not available during the south-west monsoon.

Rots bay or Telok Jamir Kechil, on the north-east side of pulo Nasi Besar, is about 4 cables wide at the entrance and the same deep, with a shallow rocky patch 2 cables off shore near its head. Off the south point of the bay is Rots islet, 187 feet above high water, one cable in extent, round and thickly overgrown. Westward of the islet and about 1½ cables from the shore is a rock with 3 feet water over it. Plan, 219 [2,512]. Lat. 5° 38′ N. Long. 95° 12′ E.

Anchorage. — During the south-west monsoon, there is good anchorage in 6 fathoms water, about 3 cables from the shore, north-westward of the islet.

Pulo Kelapa or **Bunta,** about 2 miles in length, lies between Cedar and Surat passages. It is covered nearly to the summit with casuarina trees and has a beach of white sand ; rocky ridges, partly above water, extend both eastward and westward of it. Chart, 219 [2,512].

The bank between pulo Kelapa and pulo Batu has 2½ fathoms least water over it, but it lies out of the track of shipping. A rock above water lies one cable off the east extreme of pulo Kelapa.

Pulo Batu, lying a mile north-eastward of the eastern end of pulo Kelapa, is a long and narrow island, generally uninhabited, and connected with pulo Angkasa by a reef of rocks. Its northern side rises almost perpendicularly and has deep water close-to ; on its southern side there is a sandy beach, with temporary anchorage off it in about 10 fathoms water, but, on account of the strong and eddying tidal streams, it is not recommended. A rock above water lies off the western end of the island.

Pulo Angkasa, a small rocky uninhabited island, is separated from the Acheh head by a channel 1¾ cables wide.

CEDAR PASSAGE (Sawang Arus Besar) lies between pulo Nasir Besar on the north and pulo Kelapa and pulo Batu on the south. Plan, 2,760 [2,534]. Lat. 5° 34′ N. Long. 95° 16′ E.

Dangers.—Batu point, the south-west extreme of pulo Nasi Besar, is high and cliffy, and lies on the north-west side of entrance to Cedar passage. At 4 cables south of the point is a sunken rock, and at one mile beyond, in a S. by W. ½ W. direction from it, is a rock nearly dry at low water. Between these rocks there is a depth of 19 fathoms, and between the first mentioned and the point a depth of 9 fathoms.

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Chart, 2,760 [2,534]. No variation.

Eastward of these, in the fairway of the passage at about 7 cables southward of the coast of pulo Nasi Besar, is a rock which just dries at low water, with depths around it of 6 to 7 fathoms.

These rocks are usually marked by breakers.

A reef extends about a quarter of a mile southward of the east point of pulo Nasi Besar.

Anchorage. — Anchorage may be obtained on the bank of 4½ fathoms between pulo Kelapa and pulo Batu.

Directions.—The channel recommended is southward of pulo Nasi Besar and the dangers just described; it is about one mile in width at its narrowest part, with depths of from 15 to 20 fathoms.

Cedar passage is much wider than Surat passage, freer from eddies, and safer for a sailing vessel with a foul wind, when, with a favourable stream, it is possible to drift under sail, taking care to avoid the fairway rocks before mentioned, and which are usually marked by breakers. The north side of pulo Batu is "steep-to," and may be kept aboard. Both these passages are subject to frequent calms, rendering Bengal passage, in which the wind is constant, preferable to either.

Tides.—It is high water, full and change, in Cedar passage, at about 9 hours.

Tidal streams.—The flood sets eastward from about low water to about high water at rates of from 3½ to 4 knots an hour, and the ebb westward at rates of from 4½ to 5 knots. The ebb is usually of longer duration than the flood, and there is but little slack water. At neap tides, and also during the north-east monsoon, there is little or no east-going or flood stream, and the west-going or ebb stream, combined with the prevailing westerly current, is strong.

Tidal rips, at times appearing almost like breakers, form in Cedar and Surat passages and northward of the Acheh islands; they are most violent during the ebb stream in the south-west monsoon and during the flood in the north-east monsoon; in this last season they are comparatively moderate. They are sometimes dangerous to small vessels at anchor in the passages.

Lat. 5° 33′ N. Long. 95° 14′ E.

SURAT PASSAGE (Sawang Arus Kechil) between pulo Kelapa, pulo Batu, and pulo Angkasa on the north-west, and the promontory of Acheh on the south-east, is funnel-shaped, narrowing from about 2 miles to less than 2 cables in width, and with from 12 to 20 fathoms water in it and no shoals.

Directions.—Surat passage may be used by short steam vessels having a speed of 8 knots, but it is not recommended for sailing vessels,

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as it is much subject to calms, and the tidal streams are rapid. Sailing vessels using it should keep nearer Acheh head than the opposite side of the channel, as Acheh head is bold, with regular depths of 12 to 14 fathoms, over sand, at a moderate distance. Chart, 2,760 [2,534]. No variation.

The south side of pulo Kelapa is safe to approach, there being from 12 to 15 fathoms water within half a mile of its south point. If the tidal stream be unfavourable, a sailing vessel must anchor until the flood stream makes.

Tidal streams.—The flood stream sets north-eastward directly through the passage, and the ebb in the opposite direction, at rates of from 5 to 6 knots an hour at springs in the narrowest part of the passage, abreast Angkasa, where the eddies caused by the rapid streams render steering difficult, if not dangerous, for sailing vessels during light winds. An eddy prevails under Angkasa, which, combined with the tidal stream coming between Kelapa and Batu, causes a confused sea, sometimes assuming the character of whirlpools. *See also* tidal streams, Cedar passage.

BENGAL PASSAGE (Sawang pulo Weh), formed between pulo Bras and pulo Weh, is about 11 miles wide and very deep, but it is the best approach, for sailing vessels, to Malacca strait from the westward. South-west or north-east winds always prevail and are fairly steady. Chart, 219 [2,512].

There is generally a north-westerly current of from one knot to 2 knots an hour through the fairway of Bengal passage; and it is advisable for sailing vessels, working to the south-eastward, to keep near pulo Bras and Nasi Besar, where the streams are tidal, and where anchorage may be taken if necessary until the flood, or south-east going, stream makes.

It is the best passage at all times when proceeding westward.

Berduri rock, which dries 5 feet, situated off the south end of pulo Weh, and a rock, with less than 3 fathoms water over it, at 3 cables off shore between Temanjung and Jum, on the west coast of pulo Weh, are the only dangers, but they do not lie near the fairway. Lat. 5° 45′ N. Long. 95° 21′ E.

PULO WEH, the north-easternmost and largest of the islands off Acheh head, is separated from the Sumatra coast by Malacca passage, about 9 miles wide. The island is about 11 miles in length in a north-west and south-east direction, from 2 to 6 miles in breadth, mountainous, and covered with luxuriant vegetation. The Dutch flag was first hoisted here in 1884. Lemoh Mati, the highest peak, is 2,395 feet above high water, and may be seen in clear weather from a distance of 36 miles. The east and west coasts are fairly straight with deep water generally close-to; the north coast is indented by Peria Laut and Sabang bays, and the south coast by Balahan bay. Lat. 5° 47½′ N. Long. 95° 21′ E.

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Chart,219 [2,512]. No variation.

Small villages lie scattered over the island, which is thinly populated. The chief industries are pepper growing and fishing; sulphur is found in considerable quantities, a sulphur spring being about two hours' walk from Balahan village. Anak Laut, a small lake, lies in the north-east portion, where, and also in Balahan bay, are several streams of fresh water.

Epidemics are unknown, and the island is considered to be healthy.

Lat. 5° 54′ N. Long. 95° 15′ E.

West coast.—Ujong Bahu, the north-west point of pulo Weh, falls steeply from the mountain to the sea, and is surrounded by masses of rock which have fallen away from above, beyond which it is "steep-to." The whole west coast is cliffy, excepting a sandy bay between capes Jum and Uhoh, but a steep reef extends 2 cables off shore between ujong Bahu and cape Temanjung; from its extreme, with 4 fathoms water, ujong Bahu bears N. ½ E. distant 1¾ miles.

A rock, with less than 3 fathoms water over it, lies 3 cables off shore between capes Temanjung and Jum.

Anchorages.—In the sandy bay between capes Jum and Uhoh there is good anchorage, during the north-east monsoon, in from 10 to 12 fathoms water; and to the southward, between capes Arroon and Berduri off Paja village, there is anchorage in a depth of 10 fathoms.

South coast.—Berduri rock, small and drying 5 feet at low water, spring tides, lies 6 cables southward, of ujong Berduri, the south end of pulo Weh; a rock with 3 fathoms water over it lies 1¼ miles east-north-eastward of Berduri rock and 3 cables off shore; there are usually strong tide rips over these rocks.

Tides.—It is high water, full and change, at pulo Weh at 9h. 45m.; springs rise 7 feet, neaps 4¾ feet. The highest tides occur about 2 days after full and change and, in May, are highest during the day and in November during the night.

Lat. 5° 48½′ N. Long. 95° 23′ E.

Balahan bay, on the south-east side of pulo Weh, is nearly two miles deep, and 1½ miles across the entrance, with depths of from 40 to 80 fathoms; a reef fringes the eastern and western shores of the bay for a distance of half a cable.

Ujong Sekeh, the east point of entrance to the bay, is a lofty point with depths of from 30 to 40 fathoms close-to.

Somewhat inland from the anchorage is Balahan, the largest village on the island, and the residence of the chief of Weh. Near the village are fresh water springs and a stream. There is a sulphur mine in the vicinity, distant about 2 hours' walk, and near the foot of a hill fumes issue from a small crater; some boulders of stone resembling granite are found.

Anchorage may be obtained, in not less than 16 fathoms water, at about 100 yards off the sandy shore at the head of the bay; it can be used in both monsoons, but most shelter is afforded during the south-west.

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Ayer Melek, a point midway on the east coast, has a rock above water just northward of it. Chart,219 [2,512]. No variation.

TAPA GAJA, the north-east point of the island, is not very high, but rises rapidly towards the mountains within.

LIGHT.—A *white flashing* light, with a period of twenty seconds, is established at an elevation of 56 feet above high water, from an open work, iron support, 42 feet in height and painted white on Tapa Gaja ; it shows *flash* for *five seconds*, is eclipsed for *fifteen seconds*, and should be visible, in clear weather, from a distance of 13 miles between the bearings of S. 55° E., through south and west, to N. 57° W. (178°). Lat. 5° 53½′ N. Long. 95° 21½′ E.

Lloyds signal station.—There is a Lloyds signal station on Chot Perimpun, the hill westward of ujong Tapa Gaja, at an elevation of 267 feet above high water ; it has telegraphic communication with all parts of the world, and will receive signals at night.

SABANG BAY, south-eastward of Chot Perimpun, is nearly one mile in length between pulo Kelas and the head of the bay, the entrance between the Masam point and pulo Kelas being 4½ cables wide ; the depths are from 8 to 25 fathoms, with a bottom of sand, coral, and gravel, and the bay is completely sheltered from wind and sea at all seasons. Chart, 2,201 [2,536].

To the southward of pulo Kelas there is a small bay about half a mile long, in an east and west direction, and a quarter of a mile wide; it is approached by a channel less than a cable in width, to the eastward of pulo Kelas, with about 3½ fathoms water in it, but inside the depth is 10 fathoms, over mud.

Pulo Kelas, about 4 cables in length, in an east and west direction, lies in the southern portion of Sabang bay, and is a desert island, entirely overgrown except on the east side; on its south side is a cove with a good landing place. Its west side is connected with pulo Weh by a reef with a least depth of 1½ fathoms on it.

LIGHTS.—On the north point of pulo Kelas, an iron framework 42 feet in height and painted white, exhibits, at an elevation of 107 feet above high water, a *white flashing* light with a period of system of *three seconds*, showing a flash for *one second* and eclipsed *two seconds* ; it should be visible, in clear weather, from a distance of 15 miles, between the bearings of S. 71° E, through south, to S. 12° W. and in Peria Laut bay as far southward as N. 86° E., but is obscured by the land in other directions. The keeper's dwelling is of stone with a red roof. Lat. 5° 53′ N. Long. 95° 19′ E.

A *red fixed* light is exhibited, at an elevation of 50 feet above high water, from an iron frame, 47 feet in height, painted white, and situated on

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Chart, 2,201 [2,536].
Lat. 5° 53½′ N.
Long. 95° 19½′ E.
No variation.

Masam point; it should be visible, in clear weather, from a distance of 3 miles, but is obscured by the land when bearing southward of S. 48° E.*

A *red fixed* light is shown from the tower of the custom house.

Settlement.—There is a Dutch settlement at the northern head of the bay, and a small fort on a plateau about 100 feet above the sea; the native population is about 800, who make a living out of pepper and cocoa-nut plantations. The Colonial Government is represented by a Controller, who has a Staff, and acts also as Master-Attendant. The village of Sabang, at the foot of the fort, is inhabited chiefly by Chinese, and near the landing place is the residence of the Controller.

The Sabang bay Harbour and Coal Company's settlement, in addition to coal sheds, workshops, &c., contains houses for the European staff, with Coolie dwellings, a hospital, and post and telegraph offices.

Buoys.—A can buoy, painted black, marks the south point of the reef which extends from Masam point.

A conical buoy, painted white, marks the edge of the shore bank north of pulo Kelas.

Two conical buoys, painted white, mark the edge of the shoal water on the east side of the bay, opposite Masam point.

Communication.—The Royal Packet Company's steamers running between Singapore and Padang, and touching at the ports on the West Coast of Sumatra, also those between Penang and Batavia, call fortnightly; there is besides a direct fortnightly service between Sabang and Deli. Dutch mails steamers, from and to Europe, call every fortnight.

A steamer runs two or three times a week to Acheh. Telegraphic communication with all parts. *See* Chapter I., p. 21.

Coal and Supplies.—Welsh and Bengal coal of the best quality, also Sumatra coal can be obtained, the Company having an engagement to keep 10,000 tons of coal always in stock; the coal is put on board in baskets, at the rate of at least 50 tons per hour, and if timely notice is given the rate of coaling could be increased to 80 tons per hour. If ordering coal by cable the telegraphic address is "Harcoal, Sabang."

The coaling jetty is 1,130 feet in length, with a depth of over 30 feet at low water, and the largest vessels can go alongside; behind the coaling jetty are eleven double sheds, capable of stowing 25,000 tons of coal. The coal wharves are lit by lantern lights. Four electric transporters are nearly ready and will take coal to vessels at the rate of 50 tons per hour.

General chart, 2,760 [2,534].
* Power of light increased 1906.

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Chart, 2,201 [2,536].
Lat. 5° 54′ N.
Long. 95° 20′ E.
No variation.

Ships' stores and provisions can be obtained at moderate prices.

Water is abundant and of excellent quality; it is laid on to the coaling jetties, from wells about 2 miles inland, and 1,000 tons could easily be supplied in 24 hours. An ice factory supplies ice at a moderate price.

Coal signals.—Vessels requiring coal, in order to expedite despatch, should use their steam whistles; the long blasts should sound about 10 and short about 3 seconds. The signals are as follows:—

Requiring	50 tons	- -	One short whistle,
„	75 „	- -	Two short whistles,
„	100 „	- -	One long whistle,
„	150 „	- -	One long and one short,

and so on, long whistles denoting quantities in hundreds, and short whistles 50 tons or greater portion thereof.

Piers.—There are two iron T headed piers, each 230 feet long, for vessels to lie alongside for repairs.

Docks.—The floating dock is 295 feet long, 78¾ feet wide, with a depth of 20½ feet on the sill; it has a lifting power of 2,800 tons, and vessels of 360 feet in length and drawing 18 feet water may be docked. It is contemplated to construct graving docks.

There is a slipway for small vessels.

Repairs.—Small repairs to hull and machinery can be executed, there is a 7 tons steam hammer, and castings can be made.

Pratique.—The medical officer, attached to the garrison, issues Bills of Health, free of charge.

Submarine telegraph cable.—Sabang is connected by cable with Olehléh.

Trade.—No port or anchorage dues are charged in Sabang bay.

Mooring buoys.—Five mooring buoys are laid down off the coa wharves, and to facilitate mooring at night, display lantern lights.

Tug.—A steam launch is always in readiness to assist vessels entering the harbour.

Anchorages.—The anchorage in the northern part of the harbour, in from 15 to 22 fathoms water, is good at all times, the bottom being a combination of sand and coral. Anchorage may also be obtained by small vessels southward of pulo Kelas, in 10 fathoms water, over mud, but the channel leading to it, less than a cable in width, with a depth of 3½ fathoms, has a rock, with 2 feet water over it, on the island side, and it would be advisable to buoy this before entering.

Vessels entering at night should not round Masam point too closely on account of the dock.

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Chart, 2,201 [2,536]. No variation.

Tides.—*See* Pulo Weh, p. 62.

Climate.—The climate is similar to that of Colombo and Singapore, and very favourably influenced by the monsoons; the wind blowing, according to the monsoon, from N.E. or S.W. Calms are prevalent during the months of March and April, but in Sabang bay there is always a light mountain breeze.

Epidemics are unknown, and the island is very healthy.

Chart 219 [2,512].

Peria Laut bay lies westward and southward of Sekunu point, which is 307 feet above high water, wooded, and the west extreme of Sabang bay. It is about 2 miles in length and breadth, with good anchorage near its head, in from 9 to 12 fathoms water just westward of Peria Laut stream, the bar of which dries at low water. In the southern part of the bay there are one or two streams of warm, sulphur-laden water.

Reefs.—A patch, with 5 fathoms water over it, lies about 1¼ cables from the shore, between points Murung and Bateh Matien, on the western side of the bay, and at about half a cable northward of the latter point is a patch of 4 fathoms; both are "steep-to." The coast is fronted to a short distance by a reef with rocks above water.

Plan, 2,201 [2,536].

Bateh Murunrun, 2 miles westward of Sekunu point, is a rocky point with a reef of rocks extending 2 cables north-north-eastward of it.

Lat. 5° 54′ N. Long. 95° 16′ E.

Pulo Rubia, nearly 9 cables in length, in a north-north-west and south-south-east direction, and about 2 cables in breadth, consists of small wooded hillocks, the highest being 133 feet above high water; it is clear of dangers, but at 50 yards of its southern point there is a rock with 3 feet water over it.

Selako, nearly 3 cables northward of pulo Rubia, is about 200 feet above high water, and has a rock above water lying about one cable northward of it. Southward of Selako there is a group of rocks, northward of which are two shoals with 1¼ and 2 fathoms water over them respectively, but southward of the group, between it and Selako, the channel is clear.

Anchorages.—Anchorage may be obtained in from 13 to 17 fathoms water, about a cable south-eastward of pulo Rubia and the same distance off shore.

The strait, about 1½ cables in width, between pulo Rubia and the main island, also affords anchorage in from 8 to 9 fathoms water.

Coast.—The coast northward from Batch Murunrun to ujong Bahu is fringed by a reef which is "steep-to."

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Tidal streams.—The flood, or south-east going stream, increased by the easterly current which prevails northward of pulo Weh, sets into the strait between pulo Rubia and the main island at the rate of 3 knots an hour at springs; the ebb is much weaker. Plan, 2,201 [2,536]. No variation.

NORTH COAST OF SUMATRA.—Mountains.—The coast between Acheh head and Diamond point, about 140 miles in extent, is very varied; in places the cliffs rise precipitously from the sea to a considerable height, crowned by dense vegetation; in other portions there are sandy beaches, or cultivated plains reaching to the shore, with numerous villages or kampongs scattered over them. At various distances inland are several prominent mountain peaks affording ready means for fixing the position of a vessel; many of these peaks are within 12 miles of the coast, and may possibly be recognised by the following description:— Chart, 219 [2,512].

Gle Raja or mount Paran, 1,673 feet above high water, is the highest portion of the range of which Acheh head is the northern extreme. Lat. 5° 31½′ N. Long. 95° 15½′ E.

Gle Durung is the northernmost hill situated within Pedro point. Lat. 5° 37′ N. Long. 95° 28′ E.

Gle Gaja is the highest peak of the chain of hills within Pedro point. These peaks, about 1,000 feet above high water, are, however, much alike, being thinly wooded and undulating, and form the north-west spur of the Selawa Janten or Golden mountain.

Gle Ayer Panas, 984 feet above high water, has a flat summit, and lies 5 miles south-westward of Batu Putih point; Gunong Eimperusong, with a green summit, lies midway between. Lat. 5° 35′ N. Long. 95° 36½′ E.

Gunong Melijung, 8 miles south-eastward of Batu Putih point, is dome-shaped, and 1,968 feet above high water. Lat. 5° 30½′ N. Long. 95° 41½′ E.

Goudberg, or Selawa Janten, known also as Golden mountain, about 4 miles southward of Melijung, is cone-shaped, 5,663 feet above high water, and visible from a distance of about 80 miles in exceptionally clear weather. Lat. 5° 26½′ N. Long. 95° 41′ E.

Pedir of Weesberg, or Selawa Betina (Orphan), 3,117 feet above high water, and 7 miles eastward of Goudberg, is easily recognised by its flattened cone, which has a slight depression in the middle. Lat. 5° 25¾′ N. Long. 95° 48′ E.

Close to the coast, and about 4 miles westward of Merdu, is Trengading, a very steep hill 229 feet above high water, with a solitary tree on its summit. There are two conspicuous villages near it. Lat. 5° 15½′ N. Long. 96° 12½′ E.

Gle Tambineh, nearly 12 miles within Merdu, is 4,931 feet above high water, but not easily identified. Gle Samalanga, 4 miles eastward of it, is dome-shaped, and 3,950 feet above high water. Lat. 5° 2′ N. Long. 96° 17′ E.

Gle Punchek, 4,872 feet above high water, 4 miles eastward of Gle Samalanga, is a flattened cone not easily recognised. Lat. 5° 1′ N. Long. 96° 27′ E.

General chart, 2,760 [2,534].

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Chart, 219 | 2,512]. No variation. Lat. 5° 10′ N. Long. 96° 27′ E.

Bengalang, 5 miles within Raja point, is 951 feet above high water, with a flattish top.

Lat. 5° 9′ N. Long. 96° 36′ E.

Pedada, or Gle Ram, 1,345 feet above high water, 4 miles southward of Pedada, has a great rounded horn on its summit, very sloping to the westward and somewhat steeper to the eastward.

Lat. 5° 2½′ N. Long. 96° 38′ E.

Bukit Goh, or Elephant mountain, 3,445 feet above high water, and 10 miles southward of Pedada, resembles an elephant with its head to the westward.

Gle Lamruja, between Pedada mount and Pasangan hills, is conspicuous.

Lat. 5° 10′ N. Long. 96° 46½′ E.

Pasangan, or Gle Mung Mung, 984 feet above high water, has a thicket on its summit with two trees higher than the others.

Lat. 4° 48′ N. Long. 96° 49½′ E.

Chunda range, known also as Gle Gardung, 25 miles from the coast, has two craters, shaped like truncated cones, on the east and west sides of the range; the eastern is 9,974 feet, and the western 10,698 feet above high water.

Lat. 4° 55′ N. Long. 97° 13¼′ E.

Pasai range to the eastward attains a height of 5,335 feet, but has no conspicuous summit.

Lat. 4° 47′ N. Long. 97° 29′ E.

About 16 miles south-eastward of the Pasai is Gunong Tumian (Temin of Semuang), the summit of which is 5,741 feet above high water. Continued on p. 83.

Winds. — Currents. — The remarks on winds, currents and climate of the north coast of Sumatra will be found in Chapter I.

Tides.—*See* p. 36.

COAST.--Acheh head to Pedro point.—Acheh head with King point, situated 3½ miles to the south-south-westward of it, form the north-west extreme of the island of Sumatra; both are bluff promontories, and the summit of the peninsula, of which they are a part, attains a height of 1,673 feet above high water in Gle Raja, beforementioned; Acheh head is "steep-to" at a short distance.

Between Acheh head and Pedro point are Olehléh and Gigieng bays, separated by the point and spit at Acheh river. The coast at Acheh head, and for about one mile to the eastward, is rocky and steep, beyond which it is sandy for the whole distance to Pedro point; with the exception of Acheh head it may be approached by the lead, the bottom being composed of black sand for about 3 miles off shore, with white sand and shells outside that distance.

In places, especially near Gigieng river mouth, there are sand hills within which the land is in great part morass, with but scanty vegetation; but occasionally there are trees of some height. The morass is intersected

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by creeks and lagoons, with footpaths connecting the several villages which are generally situated on the higher ground. Chart, 219 [2,512]. No variation.

The villages are numerous and are usually surrounded by alang-alang woods, lofty cocoanut trees, or cultivated ground. Kota Raja, the capital of Acheh province, is situated in the valley of Great Acheh, nearly 2 miles inland.

Kwala Najid Panchur, the mouth of the lagoon close eastward of Acheh head, has a depth of 1½ feet at low-water, spring tides, the channel passing within 50 yards of Acheh head. The lagoon is very shallow, and Lampagar, a large village, is on its eastern shore. Plan, 219 [2,512].

Pulo Tuan, a small dome-shaped islet, 120 feet above high water, is in the west part of Olehléh bay, about three-quarters of a mile eastward of Acheh head, with which it is connected by a ridge of rocks above water in places; there are depths of 5 fathoms to within a short distance northward of the isle, but no available channel between it and the shore except for canoes. Lat. 5° 33½' N. Long. 95° 17' E.

Landing may be effected on the south side of the island, where there is a path leading to its summit on which there is a burial ground.

Kwala Chankul, the mouth of the lagoon, one mile westward of Olehléh, has a depth of 3½ feet at low water, spring tides; the lagoon is shallow, but there are passages for canoes leading southward of Olehléh eastward to Acheh river, and westward to Lampagar lagoon. Pagani block house, black with a zinc roof, on the narrow spit of land westward of the entrance, is conspicuous.

OLEHLÉH, the port of Kota Raja, is situated on the eastern part of the narrow spit of sand which separates Chankul lagoon from the sea. Plan, 219 [2,512]. Lat. 5° 33' N. Long. 95° 18½' E.

Piers.—There are three landing piers; the western or government pier, connected with the steam tramway, is fitted with two steam cranes.

Communication. — Vessels of the Netherlands Royal Packet Company, leaving Batavia and Padang every fortnight, call at Olehléh, touching at the coast ports, and several steamers trade between Olehléh and Penang. Olehléh is connected with Kota Raja by a steam tramway 2½ miles in length. There is telegraphic communication with Kota Raja and by cable. *See* Chapter I., p. 21.

Supplies.—Fresh beef, poultry, vegetables, bread, &c., are obtainable, and fruits when in season. There is no good drinking water.

Hospital.—There is a fine hospital with 800 beds at Kota Raja.

Trade.—The exports are pepper, betel nuts, gutta-percha and other gums, rattans and cocoanuts. The imports are chiefly piece goods and

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Chart, 219 [2,512]. No variation.

all kinds of provisions. Most of the exports and imports on the north coast are collected and distributed at Olehléh. In 1902 the port was entered by 178 steam vessels.

Submarine telegraph cables connect Olehléh with Deli and with Sabang.

Kota Raja, the capital of Acheh, is situated on the left bank of Acheh river, about 3 miles from the entrance. The governor of Acheh province resides here, and in 1900 the population numbered 5026, of which 461 were Europeans.

Anchorage.—Olehléh bay affords good anchorage in about 5 fathoms water, over black sand, and good holding ground, abreast the piers, but it is stated that the soundings, inside the 5-fathoms contour line, decrease more rapidly than shown on the chart. A long scope of cable is necessary, and vessels of heavy draught should anchor farther out; a second anchor should be ready. There is a heavy sea at times in both monsoons, and smooth water can only be depended on for a week or two at the change of the monsoons.

During the south-west monsoon violent gusts blow from the valley southward of Acheh head, and during the north-east monsoon the sea and swell are sometimes so heavy that communication with the shore is interrupted. Land and sea breezes often blow during both seasons, but the land breezes do not extend beyond the islands. The forenoon is generally calm and the best time for landing, &c. The roadstead is infested by sharks. *See* winds, &c., and rainy season, &c., pp. 25, 33.

Directions.—Approaching Olehléh road from the north-eastward, by keeping the perpendicular south fall of the hill, 1½ miles within Acheh head, bearing S.W. ¾ W. or southward of that bearing, the shallow water, extending off Acheh river and eastward of it, will be avoided. From the westward, the reef, lying between Acheh head and pulo Tuan, should be avoided.

Tides.—*See* North and N.E. coast of Sumatra, p. 36.

Tidal streams.—The flood or east-going stream setting against the prevailing westerly current is weak; the ebb or west-going stream runs longer and with greater strength than the flood.

Lat. 5° 35½′ N. Long. 95° 21½′ E.

Acheh river.—The mouth of the Acheh river is nearly 3 miles north-eastward of Olehléh; the 3-fathoms contour line, which south-westward of the river mouth is about 3 cables off shore, extends about one mile off north-eastward of it.

There are two shallow channels into the river; the western one has usually a depth of 2 feet at low water, spring tides, and the eastern about one foot; but both are subject to constant change. Small craft drawing

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4 feet water can ascend the river to Kota Raja, the capital, and lesser draughts some distance above. The banks of the river are swampy as far as Jawa village, 2 miles up, and are partly inundated during the rainy season; above the land is higher. Chart, 219 [2,512]. No variation.

The river is bridged near Penajung and Kota Raja, and there are several villages on either bank. Canoe passages connect the river with the Chankul and Gigieng lagoons on either side. Kota Pohama, a military station with a zinc roof, situated near the shore about midway between Acheh river and the mouth of Gigieng lagoon, is conspicuous; landing is easy here in the morning.

Gigieng lagoon lies within the low sand hills extending eastward of Acheh river, its entrance being about 4 miles eastward. It is very shallow, but admits fairly large boats to ply between the military stations of Kota Pohama and Pakan Krung Chut. The 5-fathoms contour line extends $1\frac{1}{2}$ miles seaward of the entrance to the lagoon, and there is a bank, with 6 fathoms water over it, lying nearly 2 miles north-north-west of its mouth; eastward to Pedro point the 3-fathoms contour line extends from 3 to 5 cables off shore.

MALACCA PASSAGE, 9 miles in breadth, separates pulo Weh from the north coast of Sumatra, and is the best approach to Olehléh from the northward.

Pulo Buru, a small rocky island about half a cable in extent and having on it some cocoanut palms, lies in Malacca passage distant $2\frac{3}{4}$ miles from the north-western part of Pedro point; it is fringed by a reef with rocks above water on which the sea generally breaks heavily. Care is necessary in approaching the islet, as the tidal streams set strongly over the surrounding reef.

LIGHT.—A *white fixed* light is exhibited, at an elevation of 62 feet above high water, from an iron standard on a white dwelling, 46 feet in height, on pulo Buru; it should be visible from a distance of 12 miles, in clear weather.* Lat. 5° 40½ N. Long. 95° 25′ E.

Anchorage may be obtained in 8 fathoms water, over sand, at about three-quarters of a cable E. by N., or in the same depth at 2 cables W.S.W. of the island.

COAST.—From Pedro point to Pedir point, a distance of 28 miles in an east-south-east direction, the hills approach the coast nearly the whole distance, and the flat swampy shore only attains to any considerable breadth on the west and south sides of Krung Raja bay. Parts of the coast are composed of chalk, or sandstone, and are steep, as at Lubu, Batu Putih, Segi, and Pedir points; elsewhere it consists of sloping sandy

General chart, 2,760 [2,534].

* To be altered to *white occulting*, every *twenty seconds*, showing light, *fifteen seconds*; eclipse, *five seconds*.

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Chart, 219 [2,512]. No variation.

soil and is partly wooded. There are several unimportant streams, but most of the entrances to them are closed during a prolonged drought.

With the exception of a 4-fathoms patch in Krung Raja bay, and a shoal eastward of Batu Putih, there are no dangers beyond half a mile from the shore.

Anchorage.—Vessels should not anchor in less than 8 to 10 fathoms water; the bottom is chiefly rocky, especially off the headlands.

Directions.—A sailing vessel proceeding from Acheh along this part of the coast should keep near the land, as temporary anchorage can generally be obtained. The bank fronting the shore within the 100-fathoms contour line, is fairly "steep-to," with westerly and variable currents outside its limits, and calms are more prevalent in the offing than nearer the land. Every advantage should be taken of the land wind, which sets in about 8 or 9 p.m., and continues through the night.

Tidal streams.—The tidal streams near the shore are regular, but the ebb or west-going stream, being in the same direction as the current, is much the stronger of the two.

Lat. 5° 39′ N. Long. 95° 28′ E.

Pedro point (Tanjong Batu), the northern point of Sumatra, is a low headland, and may be recognised by the group of casuarina trees growing not far from the beach. Close to the westward of the point is the entrance to a shallow lagoon, generally marked by surf, and dry at low water. The 5-fathoms contour line is more than half a mile off Pedro point.

A patch, with a depth of 2½ fathoms over it, lies 4 cables off Ladung creek, south-eastward of Pedro point.

Plan, 219 [2,512]. Long. 5° 36½′ N. Lat. 95° 33¼′ E.

Krung Raja bay lies between Pedro and Lubu points, a distance of 4½ miles, the mouth of the Krung Raja river being in the south-east part of the bay, with Raja village near it; the entrance to the river is dry at low water. The west and south sides of the bay are marshy, but eastward of the river the coast is a precipitous cliff. Batu Kapal or Rangmajang, a sandstone rock, lies about 3 cables off Lubu point, with a depth of 3 fathoms in the fairway between. The shores of the bay are fringed by a bank extending to the distance of about 2 cables, and there is a patch, with a depth of 2 fathoms over it, lying 3 cables south-westward of Lubu point. A reef extends about the same distance north-west of the point.

Shoal.—A coral patch, with 4 fathoms water over it, "steep-to," and from 10 to 20 fathoms close around, lies in the western approach of Krung Raja bay, at 1¼ miles off shore, with Batu Kapal bearing

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S.E. by E. ¾ E., distant 2 1/10 miles, and pulo Buru a little open of Pedro point, about N.W. by W. ¾ W. It affords good temporary anchorage, and for that purpose should be approached with the latter marks as given. Plan, 219 [2,512]. No variation.

Anchorages.—The bay is inconveniently deep for anchorage, and on the west side the bottom is foul, but it is the only anchorage on the north coast that is usually free from swell in both monsoons. The best position is at the head of the bay, in 17 fathoms water, about 3 cables off shore, with Batu Kapal in line with Lubu point bearing, N.E. ¾ N., and the south-west point of pulo Weh in line with Pedro point N.W. ¾ W.

There is also good anchorage, in 7 fathoms water, eastward of Batu Kapal with the south point of that island in line with pulo Buru, bearing about N.W. by W. ¾ W.

Tides.—*See* Tides, North coast of Acheh, p. 36.

Batu Putih or White cliff, lying 10½ miles eastward of Pedro point, is formed of chalk and sandstone, falls steeply to the sea, and is easily recognised by a large white patch showing up on green land. At about 1¼ miles eastward of the cliff the 5-fathoms contour line is nearly one mile off shore, with two patches, with 3 fathoms water over them, nearly that distance off and "steep-to." The Ayer Masin creek, dry in its mouth at low water, lies south from the eastern patch. Chart, 219 [2,512]. Lat. 5° 37′ N. Long. 95° 38¼′ E.

Villages.— Lampanas village, large and surrounded by cocoanut trees, is situated on the coast 4½ miles south-eastward of Batu Putih, and there is a long row of trees eastward of it. Tanjong Segi is a high portion of the coast midway between Batu Putih and Pedir point, and between it and Lampanas is Lengah village, on the west side of entrance to Ayer Masin creek.

Rocks.—Three detached rocks, with about 2 feet over them at low water, lie just within the 3-fathoms contour line off a point with a group of casuarina trees between Belang Raja and Chure, situated 3½ miles north-westward of Pedir point.

Pedir point (Tanjong Sagi), being the extreme of a range of hills sloping steeply to the sea, is easily recognised; it has a coral reef, "steep-to," extending half a cable off it and, at a distance of half a mile, the depths are about 18 fathoms. A lagoon lies within the coast at about 2 miles westward of the point. Lat. 5° 30′ N. Long. 95° 54½′ E.

COAST.—From Pedir point to Raja point, a distance of 38 miles, the coast forms an indentation sometimes known as Pedir bay, which consists of a narrow strip of sandy coast covered by brushwood, with here and there groups of trees. Small fishing villages are scattered along the

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Chart. 219 [2,512]. Var. 0° 3′ E.

coast, and within it the ground is swampy; but not far inland it becomes undulating, and is cultivated, fertile, and thickly populated.

Pedir or Segli river is the principal stream on this part of the coast, and between it and Enjung stream, from a half a mile to one mile inland, is a series of thick cocoanut forests, in front of which the land is comparatively bare. Between the Enjung and Pantai Raja streams and at Trengading, 3 miles east-south-east of the latter, the hills approach the coast. Near Pantai Raja, and on either side of the mouth of Enjung stream, are three groups of high trees.

Eastward of Merdu point the cocoanut trees again approach the coast, until beyond the mouth of Janka Buya stream, where they merge with the low forest land in which lies Samalangan. Landmarks are scarce along the coast, but there are no dangers beyond half a mile off it.

Depths off shore.—The coast bank, with less than 3 fathoms water over it, extends about one-third of a mile in places; in others, as between Ayer Lebu and Beratyan, and between Samalangan and Raja point, the shore is "steep-to."

Batu creek is situated about 4 miles south-eastward of Pedir point. About one mile northward of its entrance, and at half a mile off shore, there is a patch with 2½ fathoms water over it, between the 3 and 5-fathoms contour lines.

Bengalang creek, 2 miles south-eastward of Batu creek, has a low water depth of 3 feet in its rather wide entrance. It has several high trees on its right bank, one standing much higher than the others, and two on its left bank, which render it easily recognisable.

Lat. 5° 23′ N. Long. 95° 59′ E.

Pedir river.—Kwala Pedir, the western mouth of the Pedir river, dries at low water. Segli, the eastern mouth, has two entrances, but the westernmost dries at low water. The eastern entrance has a depth of 2 feet at low water, marked by stakes, but it is subject to considerable alteration both in direction and depth, and at times both the Pedir and Segli river discharge through a common mouth.

Half a mile above the entrance the Segli river is only navigable by canoes. The land is exceedingly fertile, and the population considerable. Twenty-four miles up the stream is Kemala Dalem, where the claimant to the Sultanship of Acheh resides.

Segli.—The Dutch station of Segli is at the mouth of the stream, and there are military posts on both sides of it. About one mile from it, connected by a good footpath, is the large village of Pedir and an old ruined Portuguese fort.

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Communication.—The Netherlands Royal Packet Company's steamers running between Batavia and Penang call here fortnightly; there are also trading steamers between Olehléh and Penang. *See* Chapter I., p. 21. Chart, 219 [2,512]. Var. 0° 5′ E.

Supplies.—Fresh provisions and water in small quantities may be procured.

Anchorage.—There is good anchorage, in from 8 to 11 fathoms water, at about one mile off the coast in the neighbourhood of Segli river.

Tides.—*See* North and N.E. coasts of Sumatra, p. 36.

Tidal streams.—In the bight between Pedir point and Gighen, the streams are regular, but weak; the flood running to the eastward and ebb to the westward.

COAST.—Gighen village is 3 miles south-eastward of Segli, and Burung village, about 2 miles further in the same direction, is of some importance as a trading station; its creek dries at low water, and on the left bank are two conical shaped casuarina trees.

Ayer Lebu river has a depth of one foot in its entrance at low water, and is much used for inland trade by boats; its mouth may be identified by a few cocoanut trees a little eastward of it, and a portion of the coast near it appears from the offing as a long, sandy, bare promontory.

Anchorage.—There is anchorage off Ayer Lebu in from 8 to 10 fathoms water, but the shore is "steep-to" eastward of the river.

Enjung river, of some importance to trade, is situated about 4 miles eastward of Ayer Lebu; it has two entrances, each with a depth of 3 feet at low water; the river trends westward parallel to the coast within its mouth, and there is a least depth of 4 feet to Enjung village, situated about 2 miles within the entrance, but near the coast. The left bank of the river is sandy and thickly overgrown with brushwood. Lat. 5° 17½′ N. Long. 96° 6′ E.

A row of lofty trees is situated near the beach westward of the entrance, and to the eastward a chain of hills, covered by pepper plantations, reaches nearly to the shore.

Supplies.—Small supplies of provisions may be procured at the village.

Anchorage, in 8 fathoms water, may be obtained off the river with the western side of the ridge of hills in line with two trees at the river mouth.

Depths off shore.—The bottom seaward of the entrance deepens gradually to 10 or 12 fathoms at half a mile off shore.

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Chart, 219 [2,512]. Var. 0° 5′ E.

Pantai Raja, eastward of the Enjung river, dries at low water, and 3 miles south-east of it is the Trengading, but neither of these streams is of any importance; Pantai Raja village is about one mile from the entrance to that stream.

Lat. 5° 15¼′ N. Long. 96° 16½′ E.

Merdu point, lying 26 miles east-south-eastward of Pedir point, is low and sandy with a few small trees; a run of water resembling, when at a distance, a path in the valley, is conspicuous during the rainy season. A grove of trees is situate 1½ miles to the westward of the point.

The 5-fathoms contour line is distant about one mile from the point.

Merdu village is half a mile from the sea on the banks of the small stream of the same name, which has a depth of one foot on the bar at low water and from 4 to 8 feet inside; its banks are marshy with mangroves and nipa palms. Eastward of the stream the coast is covered with cocoanut trees, which continue along the coast to beyond Olim river.

Olim river, at about 2 miles eastward of Merdu point, makes a considerable break in the cocoanut trees, being half a cable wide in its entrance, and therefore easily recognised. It usually has two entrance channels with depths of 4 feet in each at low water, but they are constantly altering; inside, however, there are depths of from 4 to 5 fathoms in places, but it narrows to 20 yards in width at Manjang village, 5 miles from the entrance. Olim village, which is small, is situated one mile from the mouth.

Lat. 5° 12½′ N. Long. 96° 22′ E.

Samalangan river has a depth of one foot in its entrance at low water, and depths of from 2 to 3 feet, with a breadth of about 50 yards, as far as Samalangan village, one mile inside the entrance. The outlets of the lagoon eastward of Samalangan are dry at low water.

Communication.—The vessels of the Netherlands Royal Packet Company call off Samalangan at uncertain intervals, and also vessels trading between Penang and Olehléh. Telephonic communication with Kota Raja.

Anchorage.—The anchorage off Samalangan is in 12 to 15 fathoms water at one mile off shore.

COAST.—The coast from Raja point to Krung Kukus river, a distance of 36 miles, is low, sandy, and wooded, with higher land a little within it. Between Pedada and Pasangan points the low stretch of plain is covered with stretches of grass, interspersed by groves of trees. There is a row of lofty trees on either side of Krung Kukus river, giving the land the appearance of a promontory; the marshy land traversed by lagoons which lie within the shore is only a narrow strip.

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There are many villages along the coast, but good landmarks are scarce; the promontories are all low and not so sharply defined as those westward of Raja point. The hills are referred to on pp. 67, 68. Chart, 219 [2,512]. Var. 0° 5′ E.

Between Pasangan point and nearly to Krung Kukus the coast bank extends nearly half a mile off, but from the latter, for some miles eastward, the coast is "steep-to," and should not be approached within a depth of 10 fathoms; the bottom is chiefly hard sand and small stones with coral in places, and the holding ground is indifferent.

RAJA POINT, a low promontory, may be recognised at a considerable distance by a grove of high trees near its extremity; there is a depth of 5 fathoms near it, but it should not be approached to less depth than 8 fathoms or within the distance of half a mile. Red rocks, so named on account of their colour, lie one mile southward of Raja point. Lat. 5° 14′ N. Long. 96° 28½′ E.

Rocks.—At 2½ miles east of Raja point, a coral patch, of small extent, with 4¼ fathoms water over it, and "steep-to," lies with mount Bengalang bearing S.W. ⅛ S. distant 5¾ miles.

A rock, dry at low water, lies 1¼ miles south-eastward of Raja point at about 3 cables off the Red rocks; the 5-fathoms contour line passes about a mile off shore between Raja and Pedada points.

Pedada point, 6½ miles eastward and the east extreme of the bay, between Pedada and Raja points, is low, and not easily recognised from the offing; a patch of jungle marks it. Pedada stream, the mouth of which is a mile eastward of the point, is navigable for boats, and the village lies on its right bank near the coast.

Jempa village is situated about 4 miles eastward of Pedada point; it and its stream are of no importance. Lat. 5° 13′ N. Long. 96° 39½′ E.

Rocks.—Two coral patches, with depths of 3½ and 3¼ fathoms over them, lie N. ¾ E. and N.N.E. ¾ E. distant 1¼ and 1½ miles respectively from Jempa, and outside the 5-fathoms contour line; the bottom round these reefs is sand and shells.

Bengalang mount well open of Pedada point, bearing W.S.W., leads northward of them.

Doi river, which enters the sea 6½ miles eastward of Jempa village, has a low water depth of 3 feet on the bar and 6 to 8 feet inside; a bank on which the sea breaks extends north-eastward of the mouth, and a village, conspicuous from seaward, stands on the left bank of the river. The shore here is low and sandy, and the 5-fathoms contour line is 2½ cables off.

Pasangan point, situated 22 miles eastward of Raja point, is low and sandy, and may be recognised by three casuarina trees standing

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Chart, 219 [2,512]. Var. 0° 5′ E.

above the brushwood. The 5-fathoms contour line is 3 cables off, beyond which the water deepens rapidly to 30 fathoms at one mile distant.

Lat. 5° 17′ N. Long. 96° 50′ E.

Pasangan river rises in the Chunda hills and has two entrances; the eastern, which discharges at Pasangan point, has a low water depth of 3 feet, but it is constantly altering; the depth is about the same in the lagoon within, but farther inland it is much shallower.

Jangka, the west entrance has about 2 feet at low water in its entrance, and joins the main branch about three miles up. Jangka village is situated on the left bank.

Anchorage.—Good anchorage may be obtained in from 6 to 7 fathoms water, at half-a-mile from the coast, with Pasangan mount bearing S. by W.

Baru river.—The mouth of Baru river lies about 4 miles east-south-eastward of Pasangan point, with Bukit Goh in line with Pasangan mount, bearing S.W. $\frac{3}{8}$ W. It is the principal outlet of the Sawang or Maneh river which broke through here in 1892, at which time there was a depth of 6 feet at low water in the entrance, and from 5 to 12 feet within, and (with a few patches of less water) as far up as Maneh. It is subject to considerable change.

The Maneh entrance, westward of Maneh village, is almost closed. The various outlets of the Maneh are connected by shallow lagoons.

Agam Agam is the projection of the coast 3 miles eastward of Maneh, nearly three-quarters of a mile off which the Karang Misjid, two reefs, with 6 feet water over them, lie within the 5-fathoms contour line; they are "steep-to" on their seaward side. A conspicuous tree of great girth is situated on the left bank of Lapang river.

Anchorage.—Between Panja river and Agam Agam good anchorage may be obtained in from 3½ to 7 fathoms water.

Lat. 5° 15½′ N. Long. 97° 4′ E.

Krung Kukus.—The mouth of the river of that name is easily recognised by the groups of dark casuarina trees standing on either side of it. It is of some importance, has a low-water depth of 2 feet, and there is about the same depth to Krung Kukus village for a distance of one mile inside. Above this the depths are from 2 to 3 fathoms, and on the left bank are sand hills about 24 feet high, whilst the opposite bank is covered with thick brushwood and in some places dense jungle.

Shallow passages lead through the lagoons to Bungkas to the westward, and to Telok Semawi to the eastward, from abreast the village.

Anchorage.—Good anchorage may be obtained, in 10 fathoms water, abreast the mouth of Krung Kukus.

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Tides.—Springs rise about 7 feet.

Chart, 219 [2,512].
Var. 0° 5′ E.

COAST.—From Krung Kukus to Jambu Ayer or Diamond point, a distance of 27 miles, the coast forms a deep bight known as Telok Semawi. The shore is sandy, backed by a narrow strip of swampy forest land, within which, at about one mile distant, it becomes hilly. Eastward of Chunda the hills recede from the coast in a south-east direction, and the extensive plain begins, which is widest at Jambu Ayer point, and extends all along the east coast of Sumatra. The Kertei and Jambu Ayer streams which, with their tributaries, irrigate a wide tract of land, enter the sea on this coast.

The following are good landmarks on this coast:—A grove of trees at the mouth of the Pasai stream; two high trees on the left bank of the mouth of the Kertei; groves of trees at Changkul and Pidada; a conspicuous tree, with two great trunks, westward of Telaga Batang, and a wide-spreading tree, within Jambu Ayer, which, from the westward, makes as a low islet.

Dangers.—The shore between Krung Kukus and the south-west extreme of Semawi island is "steep-to," there being a depth of 10 fathoms a short distance from it; but thence eastward to Jambu Ayer a sandbank fronts the shore, and the 5-fathoms contour line, generally from about one mile to 1½ miles off, is, when to the northward of Changkul and north-westward of Jambu Ayer, distant 3 miles from the coast, and has on it several shallow coral patches.

Karang Pare, with 2 fathoms water over it, lies about 3 miles, N.N.E. ⅜ E. from the trees at the mouth of the Kertei.

Lat. 5° 13¾′ N.
Long. 97° 18¼′ E.

Karang Panggul, a coral reef, on which the depth is 4 fathoms, is "steep-to" on its north-west side, and lies 7 cables northward of Karang Pare.

Karang Bada, with 6 fathoms water over coral, is situated 4 miles from the coast, with Changkul bearing about S. by E. ¾ E.

Karang Tenga, a coral reef with 2¾ fathoms water over it, and from 12 to 14 fathoms around, lies 2⅓ miles off shore, with Jambu Ayer point bearing E. by S. ¼ S. distant 8¼ miles, and Pidada S. by W. ½ W.

Karang Timau just dries at low water, is surrounded by depths of from 7 to 8 fathoms, and lies about midway and a little eastward of a line joining Karang Tenga and the solitary tree.

Minjak, a patch with 6 fathoms water over it and 15 to 20 fathoms around, lies about 1¾ miles north-westward of Karang Tenga, with Jambu Ayer point bearing E. by S. ⅞ S. distant 9½ miles. The bottom near the

Lat. 5° 19′ N.
Long. 97° 21½′ E.

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Chart, 219 [2,512]. Var. 0° 5′ E.

shore is sand, and a short distance off it is sand mixed with mud and coral, whilst in the offing it is clay and mud. Under favourable circumstances the last three dangers show by tidal rips.

Buoy.—Karang Timau is marked, on its northern side, by a conical buoy painted black, with Jambu Ayer bearing E. $\frac{1}{3}$ S., distant 6 miles.

SEMAWI ISLAND, about 4 miles in length by one in breadth, is marshy and unproductive.

Lat. 5° 14½′ N. Long. 97° 8′ E.

Mamplam creek separates Semawi island from the main. Its entrance, situated about 4½ miles eastward of Krung Kukus, has a depth of one foot at low water, with depths of 2 fathoms in places inside. Its banks are swampy, with villages here and there, amongst which are those of the chiefs of Semawi and Chunda. Mamplam creek communicates with the Krung Kukus by swampy and shallow passages available only for canoes.

Barat Laut, the north-east extreme of Semawi island, is a sandy promontory easily recognised by the high trees just within it. The point is "steep-to," with depths of from 15 to 20 fathoms at a short distance.

Telok Semawi, the bay between Semawi island and Kertei river, is 7 miles wide, and fronted by a bank with less than 3 fathoms water to about a mile off shore. Telok Semawi may easily be recognised by the Chunda hills, a remarkable ridge, 500 feet above high water, at about 2 miles west of the village; these hills are cleared of trees, and the light green grass renders them distinguishable.

Lat. 5° 13′ N. Long. 97° 10′ E.

LIGHT.—Near Telok Semawi an open iron framework, 42 feet in height and painted white, exhibits, at an elevation of 49 feet above high water, a *white group occulting* light, with a period of system of *thirty seconds;* showing light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* it should be visible, in clear weather, from a distance of 12 miles.

Semawi town, a Dutch military station on the south-east extreme of the island of Semawi, is an important port for the inland trade, owing to the good boat harbour in the lagoon and the inland water communication from thence by Mamplam creek to Krung Kukus; the entrance to the lagoon has a depth of 3 feet on its bar at low water.

Communication.—The Netherlands Royal Packet Company's steamers, running between Batavia and Penang, call here fortnightly, and there are occasional steamers between Olehléh and Penang. *See* Chap. I., p. 21.

Supplies.—Fresh provisions and water may be obtained at Semawi.

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Pier.—There is a pier on the east side of the island, but loading and discharging is difficult here at times; it is intended to build another on the west side, in Chunda lagoon. Chart, 219[2,512]. Var. 0° 5′ E.

Anchorage.—The anchorage, at half a mile east-south-eastward of Semawi pier, has depths of from 8 to 12 fathoms, over blue mud, but it is exposed during the north-east monsoon.

Meraksa river enters the bay southward of Semawi and has a least depth of 2 feet on its bar, with from one fathom to 2 fathoms within for some distance. The village of same name lies on the right bank, near its mouth, and that of Baju about 2 miles up. Lat. 5° 10½′ N. Long. 97° 10½′ E.

Pasai river lies 4 miles eastward of the Meraksa, and has a least depth of 2 feet in its entrance. Gedong village is situated about 2 miles up stream, and a little beyond is another named Kota Karang; craft of 3 feet draught can reach there, but the channel is tortuous.

Kertei river, about 7½ miles eastward of Semawi, is a rapid fresh water stream rising far inland, and its mouth, 150 yards in width, is easily recognised by two lofty trees rising conspicuously about the brushwood; here the banks are low and covered with brushwood, and there are some villages.

Farther up the banks are higher; at Belang Pusi on the right bank and Merbu on the left bank about 4 miles up, they are from 5 to 6 feet above high water, and for a distance of 7 miles the width of the river is not less than 100 yards. The country in the vicinity is thickly populated and the land under cultivation. The bar of the river has a low-water depth of 2 feet, and with the exception of a bar with 6 feet abreast Lapang, a little above the entrance, the depths are from 2 to 5 fathoms. Craft of 6 feet draught can enter.

The capital of Kertei province is on the Jirit Majang, the first tributary from the westward above the entrance; it has a depth of 6 to 10 feet, and is about 15 yards wide. The town is also named Jirit Majang, and is about one mile up.

Anchorage.—Good anchorage may be obtained off the Kertei river in 5¾ fathoms water, with the Kertei trees bearing S. ⅛ E., distant about 2 miles.

Pidada river, nearly 4 miles eastward of the Kertei river, has also a low-water depth of 2 feet in its entrance, and may be recognised by a conspicuous grove of trees close to it. There are depths of from 3 to 4 fathoms in the river, between banks of mangroves. Lat. 5° 12½′ N. Long. 9° 21′ E.

Jambu Ayer river takes its rise at a considerable distance in the interior, enters the sea at about one mile westward of the point of the same name, and separates the province of Kertei from that of Simpang

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Chart, 219 [2,512]. Var. 0° 10′ E.

Olim. It is about 100 yards wide in its entrance, with a low-water depth of 3 feet, but the bar is usually breaking at that time. Steam vessels of 4 and 5 feet draught can ascend for about 16 miles; it is not, however, easily navigated, as there is always a strong downward current, with many snags in the rainy season, and the channel is tortuous. Discoloured water, from the river, sometimes extends for a distance of 7 miles from the mouth.

The banks of the lower portion of the river are low and swampy, and overgrown with mangroves; above they gradually grow higher, and the vegetation becomes more luxuriant, with many villages, pepper gardens, &c. Above Baba Lung, about 20 miles up, the banks are about 25 feet above the river, and overgrown with bushes.

The river is not much used by the natives for trade purposes, owing chiefly to its shifting and dangerous bar. Produce is generally taken through an artificial canal to the Simpang Olim for shipment.

Tides.—The tide is felt up to Tepin Kujon, about 2 miles above the entrance.

JAMBU AYER or DIAMOND POINT, is a sandy promontory just above high water, within which are a few casuarina trees; the coast-line seems to be slowly receding.

Lat. 5° 16½′ N. Long. 97° 29′ E.

LIGHT.—A screw pile structure, erected in a depth of 9 feet off Jambu Ayer, exhibits, at an elevation of 87 feet above high water, a *white flashing* light having a period of system of *five seconds,* which should be visible, in clear weather, from a distance of 15 miles. The duration of the flash is under *a tenth of a second.*

Spit.—A spit, on which the depth is 2¾ fathoms, extends in a north-westerly direction, from Jambu Ayer point, for a distance of 2¼ miles; it is somewhat "steep-to" on its eastern side, over which the sea breaks in places. The 5-fathoms contour line is about 3¾ miles north-west of the point, and discoloured water has been reported about the same distance north of it, therefore vessels should not approach the spit to a less depth than 10 fathoms, especially during the north-east monsoon, when a heavy swell will be experienced.

Tides.—It is high water, full and change, at Jambu Ayer point at noon; springs rise 9 feet.

Tidal streams.—The flood stream sets south-east, and the ebb north-westward, but between Jambu Ayer point and the Aroa islands the set varies a point or two according to the direction of the coast. The ebb, being increased by the prevailing north-westerly current, is stronger and of longer duration than the flood, and at springs some-

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times attains a rate of 3 knots an hour; but, when the distance from the shore is considerable, it seldom exceeds 1½ knots. Chart, 219 [2,512]. Var. 0° 10′ E.

Near the coast westward of Jambu Ayer point the tidal streams are weak.

EAST COAST OF SUMATRA.—Mountains.—The land between Jambu Ayer and Tamiang points presents from the offing one uniform stretch of high woodland with scarcely any perceptible interruptions. Inland is a chain of mountains trending south-south-eastward, a continuation of the chain in the northernmost part of Acheh, p. 67. Charts, 1,353 [2,514], 1,355 [2,513].

Gunong Tumian (Temin of Semuang) summit, 5,741 feet above high water, is the northernmost portion which can be distinguished; it lies about 21 miles from the coast and is only visible in clear weather, but its rounded tops render it useless as a mark; referred to also on p. 68. Lat. 4° 47′ N. Long. 97° 29′ E.

In the parallel of Tamiang point, a spur of this range comes within 6 miles of the coast with two recognisable summits, namely, Tamiang and Flat hill. Near Edi Rajut and Pedowa also the hills approach the coast. Lat. 4° 16½′ N. Long. 98° 8′ E.

Pedowa hills are situated near the parallel of Perlak; they are low and rounded hills, and the highest is distinguished by a leafless tree on its western declivity. Lat. 4° 53′ N. Long. 97° 48′ E.

Kwala Edi Rajut can be distinguished by the masts of the many small vessels usually lying there; and possibly by the Pedowa hills 7 miles to the southward.

A waterfall, appearing as a light streak on the mountain side, is visible off and southward of Langsar. Lat. 4° 24½′ N. Long. 97° 41½′ E.

The land within the sandy strip of shore is mostly low and swampy and covered with mangroves; at the mouths of the streams there is generally more sand, and these spots are marked by casuarina trees.

A sand and mud bank, with depths of from one fathom to 3 fathoms over it, fronts the shore to a considerable distance in places; beyond it the bottom is mud, or sand and mud.

The principal streams are the Simpang Olim, the Arakun-Du, Edi Rajut, and the Perlak, and there are several creeks intersecting the swamps; many of them dry at their entrances at low water, and are subject to considerable change.

Owing to the nature of the land the country is thinly populated; the inhabitants are mostly fishermen, and their villages are usually at the mouths of the several streams and not conspicuous from the offing.

Winds.—Regular land and sea breezes are experienced on this part of the coast in February, March, and April, the latter portion of the north-east monsoon. *See also* p. 27.

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Chart, 1,353 [2,514]. Var. 0° 10′ E.

During the strength of the north-east monsoon this coast should be given a wide berth by a sailing vessel, there being usually a heavy swell rolling on it at that season.

Lat. 5° 13′ N. Long. 97° 31½′ E.

Pari Busuk and Ringin.—Between 3 and 6 miles south-eastward of Jambu Ayer point are Pari Busuk and Ringin, two low sandy islands, covered by lofty casuarina and other trees, situated within the edge of the coast bank and separated by a shallow lagoon from the shore; the islands are conspicuous from the offing.

The 5-fathoms contour line, passing about a mile eastward of the islands, is fairly "steep to."

Rusa creek, debouching just southward of Ringin island, communicates with the Jambu Ayer river at Babalung village, up to which it is navigable for craft of 4 feet draught. The banks are swampy near its mouth, but farther up there are scattered villages on higher cultivated ground.

Sungi Belas, southward of, and communicating with, Rusa creek, is navigable for craft of 4 feet draught; it also communicates with Simpang Olim river.

A patch with a depth of 5 fathoms, and about 10 fathoms around, lies 1¾ miles off shore abreast north-eastward of Sungi Belas entrance.

Plan, 219 [2,512]. Lat. 5° 9½′ N. Long. 97° 35¼′ E.

Simpang Olim river, situated 9 miles south-eastward of Jambu Ayer, is one of the deepest on this coast. It has a depth of 10 feet on its bar at high water, spring tides, and from 2¾ to 3¾ fathoms within, as far as the Rusa branch, and the banks are swampy with many creeks discharging through them; the village of Simpang Olim is situated on higher ground about 6 miles above the entrance. The channel over the bar is marked by stakes and is subject to considerable change. The bank fronting the river, with depths of less than 3 fathoms, extends about one mile off, and the 5-fathoms contour line is nearly 1½ miles from the shore.

Tides.—Springs rise 7 feet.

Steile or Steep point, 2 miles south-eastward of Simpang Olim, is a low sandy tongue, with a thick casuarina wood, which from the offing appears like a steep headland; hence its name. It may be approached by the lead.

Malihan river, close southward of Steile point, has a depth of 7 feet at high water in its entrance, with a considerable depth within, the water discharging into it from many creeks from the morass around; it is of no importance.

Plan 219 [2,512]. Lat. 5° 6′ N. Long. 97° 37¾′ E.

ARAKUN DUR RIVER, 1½ miles south-eastward of Malihan river, is one of the most important on this coast, being broad and

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straight, and easy to navigate. There is a depth of 10 feet on its bar at high water, spring tides, close along the northern point of entrance, and ample room within for vessels that can enter, there being from 2 to 6½ fathoms water for some distance. Chart, 219 [2,512]. Var. 0° 10′ E.

Vessels of 6 feet draught can ascend to Arasan Belu island, just above which there is a bar with a low-water depth of 6 feet. Boats can reach Semantoh; some distance above this it connects with the Jambu Ayer river.

The banks of the river are swampy nearly up to Telok Sintang village, where there is a small supply of good well water. Above this the ground becomes higher and the wooded land is interspersed with pepper plantations. At Teping Kuleh, just above Sintang, there is a fresh-water stream.

Tides.—Springs rise 6 feet.

Julok river, 2 miles southward of Arakun Dur river, has a low-water depth of 2 feet and about 10 feet at high water, spring tides, on its bar; craft of 5 feet draught can ascend to Rantau Panjang village, above which it is narrow; it is no great distance beyond to Julok Besar village. Chart, 1,355 [2,514].

Gelumpang village, surrounded by cocoanut trees, lies within the entrance with a swamp behind it.

The Buging, Baga and Edi Chut rivers to the south-eastward are dry at low water and of no importance. The ground near them is all swampy.

EDI RAJUT RIVER is winding and from 20 to 30 yards in breadth with a depth of about 1½ feet on its bar at low water, spring tides, but it is subject to changes and marked by stakes; small trading craft ascend to Edi village, about 3 miles up. The Custom house is on the right bank at the mouth, from whence there is a good bridle path to Edi and, there is a fishing village on the left bank. Plan 219 [2,512]. Lat. 4° 58¾′ N. Long. 96° 46½′ E.

LIGHT.—A *white group flashing* light showing *two flashes* in quick succession every *ten seconds* is exhibited, at an elevation of 65 feet above high water, from an iron framework tower, 70 feet in height, painted white, with a dwelling at its base, and situated at the entrance to Edi Rajut river; the light should be visible, in clear weather, from a distance of 13 miles. Lat. 4° 58¾′ N. Long. 97° 46½′ E.

Edi or Edi Rajut is one of the most important places on the east coast of Acheh, and the seat of its administration.

Communication.—Fortnightly by steamers, *viâ* Deli to Singapore, and to Penang and Batavia; vessels trading between Olehlêh and Penang also call here. *See* Chapter I., p. 21.

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Plan, 219 [2,512]. Var. 0° 10′ E.

Supplies.—Small supplies are obtainable, but water is scarce.

Trade.—Edi is an open port, and represents the centre of the east coast trade, which is chiefly in the hands of Penang merchants. The exports are pepper, gutta percha, wax, rattans, and hides. The imports are provisions, petroleum, hardware, and agricultural implements. In 1902 this port was entered by 109 steam vessels.

Anchorage.—Anchorage may be obtained off the river in 5 fathoms water, with the Custom house bearing about S.W. by W., distant 1½ miles, but it is exposed during the north-east monsoon, and communication with the shore is at times impracticable. The masts of the small craft in the river serve to identify it from the offing, also a conspicuous tree, known as the tree of Edi, standing on a fairly high hill in the neighbourhood, but its position is not definitely shown.

Tides.—Springs rise 6 feet.

Chart, 1,353 [2,514].

Pedowa Kechil and **Pedowa Besar** are two shallow streams, navigable, by boats only, to the villages of like names on their banks.

Ujong Perlak, situated about 32 miles south-eastward of Jambu Ayer point, is a low and sandy point covered with tall trees, which, with the Pedowa hills 4 miles within, render it easy of recognition.

Perlak bank, with less than 3 fathoms water over it, extends 2 miles eastward and about 3½ miles northward of the point; spots on it are dry, and others nearly so, at low water, and the sea nearly always breaks over it. The bank may be approached by the lead.

Buoys.—The northern edge of the bank is marked by a buoy painted black and white in vertical stripes and surmounted by a shaft and ball, with ujong Perlak bearing S. ½ E.

A buoy, painted black and white in horizontal stripes and surmounted by a staff and ball, marks the east edge of the bank with ujong Perlak bearing about S.W. ⅝ S. Both buoys are moored in 6½ fathoms water.

Lat. 4° 54′ N. Long. 97° 52′ E.

Perlak river has a shallow entrance and is difficult to enter, but inside it is about 50 yards in breadth, and a short distance within there is a depth of 2 fathoms. The somewhat large village of Perlak is situated about 10 miles up stream, though only about 1½ miles from the shore abreast. The river banks in its lower portion are marshy, and the first fishing village is about 2 miles up. Above Perlak the ground is higher, and there are pepper gardens and other plantations.

Beacons.—Two beacons mark the entrance to the Perlak river. The outer is surmounted by a ball, painted white; the inner, which stands on the right bank of the river, by a truncated cone, painted black.

These beacons in line, bearing S. by W. ¾ W., lead in the deepest channel over the bar.

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Anchorage.—Owing to Perlak bank, vessels must necessarily anchor at some distance from the river, the nearest anchorage being on the eastern side of ujong Perlak. Chart, 1,353 [2,514]. Var. 0° 10′ E.

COAST.—The coast between ujong Perlak and ujong Tamiang, a distance of 36 miles, is uniformly low, covered with tolerably high trees and intersected by many unimportant creeks; about midway is Langsar bay. A strip of sand fronts it for the whole distance, with mangroves growing in the morass behind it, and here and there are shallow lagoons between the morass and the sand; beyond a few fishing stations the coast is almost uninhabited.

The sandy shore is conspicuous from the offing in places, namely, at Perlak, the mouth of Jingki creek, Langsar point, and between the Telega Muku and Iju creeks; between the last mentioned creeks there is a long row of casuarina trees, and also fronting the lagoon southward of the mouth of Jingki creek.

The coast is fronted by a mudbank, with less than 3 fathoms water over it, at distances of from one to 2 miles off shore, and abreast Perolin island to nearly 4 miles off; it may be approached by the lead in most places, but off Perolin island in Langsar bay, and between Pantei Kerma creek and Tamiang, it is "steep-to," dropping quickly to more than 10 fathoms.

Landmark.—The principal landmark in clear weather off this coast is the waterfall referred to on p. 83. It is about 23 miles within Langsar bay, and 2,930 feet above high water. Lat. 4° 24½′ N. Long. 97° 41½′ E.

Boga creek, about 2½ miles southward of ujong Perlak, was formerly of importance as being a short route to Perlak settlement, but it has so silted up as to be only available for canoes.

Lagot creek, 8 miles southward of ujong Perlak, has 6 feet at its entrance at low water, and is a good boat passage to Perlak settlement, southward of which it connects with Perlak river.

Jingki creek is only available for boats; its banks are marshy and intersected by smaller creeks; about 6 miles up is the village of Krut Renchong, at the fork of two streams, above which the land is less swampy, and cultivated. There is a fishing village at the mouth of Jingki creek.

Raja river is available for boats; there is a fishing village on the coast, and 5 miles up is the village of Baru; Raja village is about 8 miles from the entrance. Plan, 219 [2,512]. Lat. 4° 44½′ N. Long. 97° 57′ E.

Bajang river, between Perolin island and the main island, is navigable by its northern entrance for vessels of 7 feet draught, and depths of from 3 to 6 fathoms are found within the bar for some distance; its banks are swampy and intersected by numerous creeks. At Randau Panjang village, about 10 miles from the entrance, the river divides; the

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Chart, 1,353 [2,514]. Var. 0° 10′ E.

northern branch leading to Simpang Aras, and the western to Bagoh. The entrance south of Perolin is very shallow.

Buoys.—A nun buoy, painted black and surmounted by a staff and ball, is moored with the northern entrance to the river, bearing S.W. $\frac{1}{8}$ W. distant about 4 miles.

Three nun buoys, painted white, and a can buoy, painted black, mark the channel into the river.

Perolin island, about $2\frac{1}{2}$ miles in length by one mile in width, is low, sandy, covered with casuarina trees, and easily recognised. Shallow water extends nearly 4 miles eastward of it, and is "steep to" at its outer edge.

Plan, 3,574 [3,621]. Var. 0° 35′ E.

LANGSAR BAY, between Perolin island and ujong Langsar, is $4\frac{1}{2}$ miles wide, the same deep, and contains numerous shoals, between which there are narrow boat channels leading to the various streams that discharge into it. Near ujong Langsar, which is sandy, with a casuarina wood on it, also a blockhouse inhabited by Europeans, and a few native houses, lies pulo Telaga Tuju, separated from ujong Langsar by a channel 300 yards wide; the island, about a mile in extent, and covered with trees, can only be distinguished from the main island when coming from the south-eastward; a shallow bank extends 2 miles seaward of it.

Lat. 4° 33½′ N. Long. 98° 2½′ E.

Tides.—It is high water, full and change, in Langsar bay at 11h. 30m.; springs rise 7 feet.

Tidal streams.—The tidal streams run with considerable strength in the mouths of the rivers.

Langsar river.—The entrances to Langsar river lie on either side of pulo Telaga Tuju, and southward of pulo Rawa. Pulo Tikus lies westward of pulo Rawa; both are covered with tall mangroves, and are uninhabited.

Langsar channel, which passes westward of pulo Telaga Tuju, has a depth of 16 feet at low water, spring tides, but it is very tortuous.

The eastern channel, southward of pulo Telaga Tuju, has a depth of 9 feet at low water, spring tides, but is easier navigated. The tree on ujong Langsar, bearing S.W. $\frac{3}{4}$ S., leads in the deepest water over the bar, but these channels can only be entered with local knowledge.

LIGHT.—It is intended to establish a *white flashing* light on Pasir Puti at an elevation of 65 feet above high water.

Buoys.—A conical fairway buoy, painted black and surmounted by a staff and ball, is moored about $4\frac{1}{4}$ miles eastward of Perolin island.

Langsar channel is marked, on the starboard hand entering, by five conical buoys, painted white, and on the port hand by eight can buoys, painted black. Light buoys are contemplated.

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Anchorage.—There is good anchorage in the approach, for small craft, in about 5 fathoms water, with ujong Langsar bearing S.W. ½ W., and also abreast this point. Plan, 3,574 [3,621]. Var. 0° 10′ E.

Langsar village, the principal one, is about 14 miles from the entrance; the river is deep for some miles, but is tortuous; boats can go up to the village. The principal products are tobacco, rice, pepper, and rattans.

Birim river, westward of Langsar river, has a depth of 17 feet at high water, spring tides; some distance within the depths are as much as 15 fathoms, but the channel is tortuous. The Majapahit or Raja Tua, eastward of Langsar river, has a least depth of 6 feet, is 450 yards wide in the entrance, and deep within, but a shallow bank fronts it to the distance of 2 miles. The village of same name is 11 miles up. The Raja Muda has a least depth of 3 feet.

Rukui island, about 4 miles eastward of ujong Langsar, is only an island at near high water, at which time there is a passage for canoes only. The tall casuarina trees on the east side of Rukui stream are conspicuous; the mouth of the stream dries at low water. Chart, 1,353 [2,514]. Lat. 4° 31′ N. Long. 98° 8′ E.

Telaga Muku river, nearly 5 miles westward of ujong Tamiang, is about a mile wide in its entrance; its channel is dry in places at low water. A tolerably large casuarina tree stands on the eastern side of the mouth.

Haiu river is situated eastward of Telaga Muku river, and on the coast between there is a sandy beach with a long row of casuarina trees. The estuary of this river is about 1½ miles broad, but nearly blocked by shoals dry at low water; the channel is on the western side, has a depth of 3½ feet at low water spring, tides. Vessels of 6 feet draught can ascend nearly to Haiu village. Near its mouth is a channel to the Tamiang river, with a least depth of 10 feet.

This part of the coast should not be approached to a less depth than 11 fathoms.

Tides.—Springs rise 7½ feet.

UJONG TAMIANG.—This projecting point may be readily identified from all directions by the groups of casuarina trees situated on either side of the mouth of the Tamiang river, and which are visible from a distance of about 16 miles. A bank fronts the point to the distance of about one mile, in places not covered at high water; it is "steep-to," with a depth of 20 fathoms within a short distance. Lat. 4° 25′ N. Long. 98° 16½′ E.

A bank of small extent, on which the least water found was 13 fathoms, lies N.E. by E. ⅝ E. distant 4¾ miles from ujong Tamiang; there are depths of from 20 to 23 fathoms around.

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Chart, 1,353 [2,514]. Var. 0° 10′ E.

Anchorage may be obtained to the eastward of ujong Tamiang in from 10 to 12 fathoms water.

Plan, 219 [2,512]. Lat. 4° 25½′ N. Long. 98° 17′ E.

Tamiang river.—Kwala Besar, the main outlet of this river, lies close westward of ujong Tamiang, and is about 120 yards broad. Its channel to the sea is round the point, and between it and the dry sand-bank seaward of it, which portion of the channel is sometimes dry at low water. The depth in the river is considerable, but the channel is tortuous.

The entrance by the Haiu river and its connection with the Tamiang river affords deeper water, as mentioned above.

Buoys.—A nun buoy, painted black and surmounted by a staff and ball, is moored in 10 fathoms water, off the mouth of Tamiang river.

Tamiang (Seruwai), the chief town of the district of Tamiang, and a military post, is situated about 10 miles up the river.

Communication.—A small steamer maintains fortnightly communications with Deli river, &c.

Tides.—It is high water, full and change, off ujong Tamiang at 0h. 30m., springs rise about 7½ feet; the tide rises 2 feet only at the town. The tidal streams are irregular.

Chart, 1,353 [2,514].

COAST.—General remarks.—The portion of the coast of Sumatra between ujong Tamiang and tanjong Tanjung (Mati point), about 97 miles to the south-eastward, is low, thickly covered with vegetation, and consists entirely of an alluvial formation intersected by numerous small rivers, few of which are navigable even for small craft.

The shore is composed of mud overgrown with mangrove trees, here and there intercepted by strips of sandy beach, on which casuarina trees are almost always to be found; these are markedly distinguishable from the mangrove owing to their darker colour, greater height, and their fine needle-like foliage; many of them may be seen from a distance of 20 miles in clear weather.

Where the mangrove grows, the ground is inundated, and the mangroves extend back many hundreds of yards; within them the ground is marshy in places, but mostly the land is firm with tall trees growing on it.

Landing on the coast, other than by making use of the river channels, is in no case advisable, and is impracticable in the event of any sea or swell, which occurs particularly during the north-east monsoon. At high water, during calms, landing may be effected on the sandy beaches, but not where mangroves exist, as there the ground, if any, is all soft mud. In clear weather some low hills and the mountains inland referred to below will be sighted from the offing above the trees on the coast.

In most places the shore may be approached by the lead.

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Inhabitants.—In consequence of the unfitness for habitation of a great portion of the coast, there are but few settlements of any importance in the immediate vicinity of it; they lie further inland on the various rivers. Many of these rivers have, however, at their mouths, a fishing settlement or *bagan*, as it is termed, consisting of a collection of miserable huts. The appearance of the coast is, therefore, very monotonous, and it is not always easy to identify the locality in which a vessel may be without some local knowledge of the points and various remarkable groups of trees. Chart, 1,353 [2,514]. Var. 0° 10′ E.

Fishing stakes.—*See* p. 37.

Aspect.—Mountains.—About 53 miles westward of ujong Tamiang, in Gajuland, is the eastern end of the Acheh or Atjeh range of mountains with a noticeable peak, 10,202 feet above high water, the highest point of a broad mountain ridge. The waterfall, 2,930 feet in height, about 23 miles from the coast, and north-eastward of the mountain, is a conspicuous object in clear weather to vessels northward of ujong Tamiang. *See* p. 83. Chart, 1,355 [2,513]. Lat. 4° 16′ N. Long. 97° 25′ E. Lat. 4° 24½′ N. Long. 97° 41½′ E.

About 17 miles southward of the waterfall is the northern end of the Alas range of mountains in Alas land; this range extends about 50 miles in a north and south direction. Gunong Bandahara, one of the highest peaks, is 9,912 feet above high water. Southward of the sources of Deli river, in Batakland, is the Batak range, extending nearly parallel to the coast for about 36 miles; Jinabung attains a height of 8,136 feet. Lat. 3° 45′ N. Long. 97° 46′ E. Lat. 3° 10′ N. Long. 98° 24′ E.

From June to February the summits of these ranges are frequently visible from Malacca strait, especially in the morning, but from February to June they are only seen occasionally.

Between Langsar and Aru bays, at about 6 miles back, ranges of hills attain a height of 300 to 600 feet; but eastward of Aru bay the rise is much more gradual. The coast between Langsar bay and ujong Tamiang is intersected by a number of small streams, with sandy spots in places and clumps of casuarina trees fronting the regular growth of trees. A few fishing huts are generally found in the mouths of the streams.

COAST.—The coast between ujong Tamiang and Langkat river forms a bay about 25 miles wide and 9 miles deep, with two large islands at its head: the northern one is pulo Kumpei, and the southern, pulo Sembilang. This bay is fronted by mud flats with depths of less than one fathom, varying in distance from 1½ to 5 miles off shore, the 3-fathoms contour line being about 6½ miles distant from the centre of the bay, from which the depths decrease gradually except off the extreme points; the bottom consists of mud, sand, shells, and clay.

Fishing stakes exist on some of the banks, and are sometimes placed as far off as to be in a depth of 7 fathoms.

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Chart, 1,353 [2,514]. Var. 0° 10′ E.

Aspect.—Between ujong Tamiang and Raja Ulak river there are several sandy beaches, upon which near pulo Krung Beka, where there is a village of Chinese fishermen and traders, and Raja Ulak are groups of casuarina trees; southward of the latter, as far as pulo Kumpei, the coast consists entirely of mud covered with mangrove trees.

Chart, 3,586 [2,543]. Var. 0° 15′ E.

Pulo Kumpei and pulo Sembilang, fronting Aru bay, having tall trees growing on them, are visible from a distance of about 16 miles. Thence eastward to Gebong river the coast is all mud and mangroves, but beyond there are sandy spots in places with casuarina trees. Flat hill, 509 feet above high water westward of pulo Kumpei, is a useful mark.

Lat. 4° 16½′ N. Long. 98° 8′ E.

There are several unimportant streams between ujong Tamiang and pulo Kumpei, mostly dry in some portions of their channels at low water. The Ayer Masin river has a depth of 8½ feet, and the Seranjaya about 10 feet on its bar at high water, spring tides. The latter bar is situated nearly 3 miles, E. by N., from the north end of pulo Kumpei.

ARU BAY, within pulo Kumpei and pulo Sembilang, is 6 miles in length and 3 miles in breadth, but the greater portion of it is dry at low water, with numerous shallow passages leading to the several streams discharging into the bay; these unite in two channels, which may be considered as the continuation of the largest of these rivers, and principally of the Besitan and Salahaji.

Towards the head of the bay are a number of mud islets overgrown with mangrove trees, and the shores of the bay are mostly of the same formation, so that, with the exception of the settlements on pulo Kumpei, there are no others of any importance until some distance up the rivers.

Pulo Kumpei consists principally of firm and comparatively high ground, low at the shores, which are for the most part overgrown with mangroves. The settlement is at the south point, and on the south-east side are sandy beaches and a group of casuarina trees.

The island is covered with tall trees, the tops of which are visible from a considerable distance; the highest is about half a mile from its south end, has a round top, and is easily identified. In the middle of the island there are pepper gardens and other plantations.

Pulo Sembilang, also covered with tall trees, has mangrove shores, except at the north-west and south extremes, which consist of sand. On the first-mentioned extreme there are a few fishermen's huts, and upon the south point there are sawyers' works, a small settlement, a storehouse for petroleum, and two piers.

Lat. 4° 8′ N. Long. 98° 14½′ E.

LIGHT.—On the south-east point of pulo Sembilang a *white fixed* light is exhibited from an iron framework, 38 feet in height and painted white; it should be visible, in clear weather, from a distance of 10 miles.

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There is a framework look-out, about 100 feet in height, situated 2 cables W. by N. ½ N. of the light structure. Chart, 3,586 [2,543]. Var. 0° 15′ E.

Entrances.—Kumpei channel, the northern entrance to Aru bay, is between pulo Kumpei and pulo Sembilang; the southern, or Sembilang, channel, lies between pulo Sembilang and the main island; the latter is the deeper of the two, having about 12 feet least water. Between these are a number of ridges which dry in places at low water.

The settlement, on the south point of pulo Kumpei, has no European inhabitants; a vassal of the Sultan of Langkat and a native overseer are stationed here, in fortified dwellings. The inhabitants are either fishermen or agriculturists, and considerable traffic is carried on by canoes between the settlement and others on the rivers in Aru bay.

Communication.—There is coasting communication with Deli about once every fortnight.

Supplies.—Poultry, fish, and good water are obtainable.

Kumpei channel.—The bar of the Kumpei has a depth of 12 feet at low water, spring tides, over sand and mud; but the straight channel indicated by the buoys has only a depth of 9 feet. The shallow banks on either side are composed of hard sand. Lat. 4° 13′ N. Long. 98° 16′ E.

Buoys.—The outer buoy, conical, painted black and surmounted by a staff and ball, lies in 5 fathoms water, with the mouth of the Babalan river S. by W. ⅛ W. and Flat hill W. ¼ N. The channel is marked by three conical buoys, painted white, on the starboard hand, and three can buoys, painted black, on the port hand entering.

Anchorage.—There is good anchorage about 1½ cables off Kumpei settlement in 5 to 7 fathoms water, with the south point of the island bearing N.E. ⅔ N. nearly 1½ cables from the shore; here the fairway is about 4 cables wide. The water is much deeper farther out. A patch of 3 fathoms, over stones, lies with the south point of Kumpei bearing N.E. by N., and west point of Seranjaya river N.W. ⅜ N.

Directions.—From seaward, by bringing Flat hill to bear West and steering for it, will lead to the outer buoy; thence for a high clump of trees seen between the south end of pulo Kumpei and the north side of pulo Sembilang, bearing about S.W. ¾ W., which leads between channel buoys but vessels should not enter without local knowledge.

Tides.—It is high water, full and change, at noon; springs rise 8 feet. At Kumpei settlement the tide is half an hour later, with half a foot more rise, and probably much more in Aru bay. The highest tides occur nearly 2 days after full and change of the moon. There are two high and two low tides in 24 hours; and from 2 days

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Chart, 3,586 [2,543]. Var. 0° 15′ E.

before to 5 or 6 days after the full and change the rise is nearly as much as at the springs; neaps rise about 3 feet.

Tidal streams.—On the bar the flood stream mostly sets S.S.W. and the ebb N.E. by N. at the maximum rate of about 2 knots; but seaward of the outer buoy they set across, the flood setting south-eastward from about 3 hours before to about 3 hours after high water, and the ebb in the opposite direction, both at the rate of about 1½ knots.

Lat. 4° 9′ N. Long. 98° 9′ E.

Salahaji river discharges into the north-west portion of Aru bay, northward of tanjong Siata, with a drying bank in its mouth. A small channel to the southward of the bank has 9 feet least water, but it is not easily navigated.

Westward of tanjong Siata the ground is firm, rising behind and here is the abandoned settlement of Pangkalan Siata.

Sembilang channel.—The entrance to Sembilang channel which lies south-south-eastward of that of the Kumpei channel, has a least depth of 13 feet on the bar, the sides of the channel being steep, and in some places dry. From the south-west point of pulo Sembilang to Pangkalan Susu the sides are also steep, especially on the northern side, and in this part there is a patch, with a depth of 2 fathoms over it, at low water, spring tides. Near Pangkalan Susu the banks are firm, without mangroves, and between this and the island southward of it there is a depth of 9 feet.

PILOT VESSEL.—LIGHT.—A pilot vessel, painted black, with two masts and "Aroe baai" lettered on the sides, is moored in 16 fathoms water at the entrance to the channel, and exhibits, at an elevation of 45 feet above the level of the sea, a *white fixed* light which should be visible, in clear weather, from a distance of 12 miles. A mooring buoy, for the use of vessels laden with petroleum, is situated about 8 cables north-north-eastward of the pilot light vessel.

LIGHT BUOYS.—Buoys.—The port side of the channel, entering, is marked by nine can buoys, painted black; of these, Nos. 3 and 5(*a*) each exhibit a *white occulting* light with a period of system of *twenty seconds*, showing light for *ten seconds*, followed by an eclipse of *ten seconds*' duration. No. 5 buoy shows a *white fixed* light, and Nos. 6 and 9 *red* lantern lights.

On the starboard side of the channel there are 11 conical buoys, painted white, of which No. 2 shows a *white fixed* light and Nos. 7 and 8 *red* lantern lights.

The light buoy, on the starboard side, showing a *white fixed* light, when in line with pulo Sembilang light structure, bearing S.W. by

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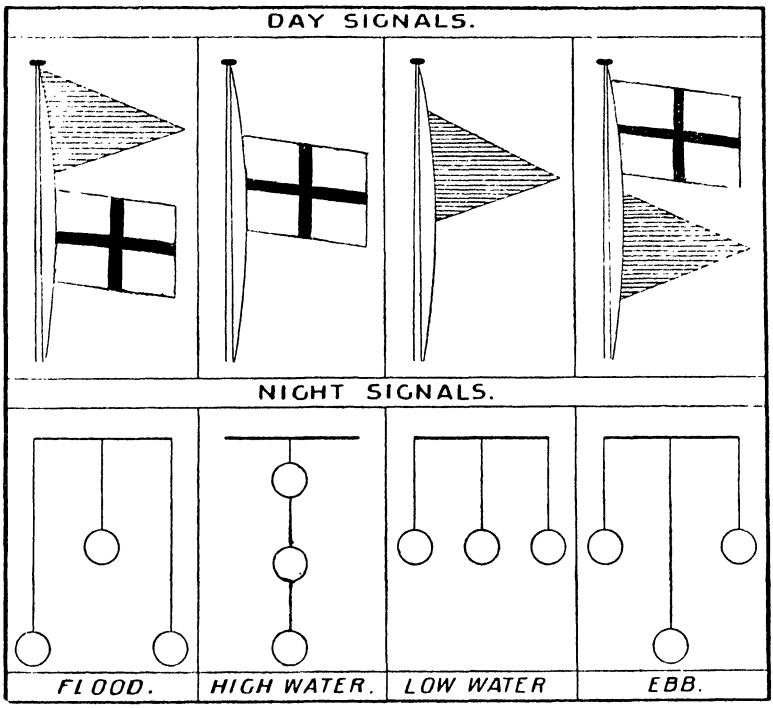
W. ⅞ W., leads in the fairway entering, and, in the event of a vessel leaving at night, the four lantern buoys, above-mentioned, will each exhibit a *red fixed* light. A beacon, 98 feet above high water, is situated about 2 cables westward of the outer white light buoy. Chart, 3,586 [2,543]. Var. 0° 15′ E.

The buoys should not be depended on.

Fishing stakes.—Two large groups of fishing stakes, one mile apart, are situated on the bank on the north-west side of the channel.

Tidal signals.—The following tidal signals are made from the pilot vessel, the flags used by day consisting of a blue triangular, and a white flag with a black cross; white lights are shown at night :—



Pilots.—There are pilots under the direction of the Harbour Master at Pangkalan-Berandan. Lat. 4° 1½′ N. Long. 98° 16′ E.

Directions.—It is not advisable to attempt this channel without local knowledge. The pilot vessel may be made from the eastward by approaching Flat hill on the bearing of W. by N. ⅝ N., and from the northward by steering for the high tree near the south end of pulo Kumpei when bearing W. ¼ S. From abreast the pilot vessel, steer to pass between the buoys marking the sides of the channel.

A group of tall trees are situated a short distance inland, eastward of Pangkalan Susu, the highest tree having a broad, round top. The bottom on the bar is hard, and in the channel mud and sand.

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Chart, 3,586 [2,543].
Var. 0° 15′ E.
Lat. 4° 2¼′ N.
Long. 98° 9′ E.

Besitan river discharges into the southern head of Aru bay, is navigable for vessels of about 7 feet draught, and may be approached by either the Kumpei or Sembilang channels. The military post of Bukit Kubu is situated on it, at about 12 miles from the settlement on pulo Kumpei.

Babalan river, about 4 miles south-eastward of pulo Sembilang, is 3 cables in breadth at its mouth; has a least depth of 3 feet in its channel, and is only available for small craft with local knowledge. Its bed is composed of hard sand and mud, and on either side are hard sand ridges partly dry at low water.

About 4 miles above its mouth, on the southern shore, is the fort of Pangkalan-Berandan of the Royal Company for working petroleum wells in Langkat. Here is a pier with a depth of 11 feet alongside its extreme at low water; the river is about 200 yards wide abreast it, with a depth of 7 fathoms midway; the depths are shallow and irregular a short distance above.

Lat. 4° 4½′ N.
Long. 98° 18′ E.

LIGHT.—On the west bank of the river entrance an iron framework, 38 feet in height and painted white, exhibits at an elevation of 36 feet above high water, a *white fixed* light, which, in clear weather, should be visible from a distance of 10 miles.

This light is only as a guide when entering the mouth of the river.

LIGHT BUOYS.—A buoy, painted black and exhibiting a *white occulting* light every *thirty seconds*, marks the port side.

A buoy, painted white and exhibiting a *white fixed* light, marks the starboard side entering.

Buoys.—Two conical buoys, painted white, mark the starboard hand, and two can buoys, painted black, the port hand, when entering.

Tide gauge.—A tide-gauge, surmounted by a red ball, is situated between the black light buoy and the white conical buoy northward of it.

Shipping.—In 1902 the port was entered by 128 vessels of which 122 were steamers.

Tides.—It is high water, full and change, in Babalan channel at 0h. 15m.; springs rise 7 feet.

At Pangkalan-Berandan it is high water about one hour later.

Lepan river, eastward of Babalan river, is narrow and tortuous, and has a depth of 2 feet in its approach.

Chart, 1,353 [2,514].

Gebong and **Serapo** rivers lie 8 and 9 miles, respectively, eastward of Babalan river; the coast between is composed of mud and mangroves, but on the eastern side of the mouth of both streams is a sandy beach. The depth in the approach to them over the bank fronting the coast is about 11 feet at high water, spring tides.

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Buoys.—A conical buoy, painted black and white in checks, and surmounted by a staff and ball, is moored about N. $\frac{5}{8}$ E., distant 4 miles from Gebong river entrance. Chart, 1,353 [2,514]. Var. 0° 10′ E.

Ujong Damar, the most projecting portion of the coast between Serapo and Langkat river, consists of sand, overgrown with dark tall trees, which are visible from a distance of about 16 miles.

LANGKAT RIVER, about half a mile wide in its entrance, lies between ujong Damar and pulo Tapakuda, and is easily identified from seaward by the high trees on the point and the island; those on the latter are casuarina trees. The flats, in its approach, which extend about 4 miles off, are very "steep-to," and have a depth of 11 feet over them at high water, spring tides; the eastern side of these should not be approached to less than 14 fathoms. Within the bar the depths are not less than 12 feet, at low water. The bottom is composed of tolerably hard sand and mud, and the banks on either side are hard, "steep-to," and dry in places at low water.

About 2 miles above the east point of entrance the river is only about 45 yards wide, leaving barely room for vessels to pass one another.

LIGHTS.—On the west side of the entrance to the river an iron support, on a shed, 20 feet in height, and painted white, exhibits, at an elevation of 45 feet above high water, a *white group occulting* light, with a period of system of *thirty seconds*, showing light *fifteen seconds*, eclipse *three seconds*, light *three seconds*, eclipse *three seconds*, light *three seconds*, eclipse *three seconds*. Lat. 4° 1½′ N. Long. 98° 28½′ E.

Leading lights are shown from the east side of the entrance. The front light, *white fixed*, is exhibited from an iron framework, 26 feet in height, painted white, and should be visible, in clear weather, from a distance of 8 miles.

The rear light, 440 yards from the above, is *red fixed*, exhibited from an iron framework 42 feet in height, and is visible over an arc of 5° on either side of the leading line.

LIGHT BUOY.—A light buoy, painted black, and exhibiting a *red fixed* lantern light, is moored on the port side of the channel.*

Buoys.—The fairway to the river is marked by a conical buoy, painted black and surmounted by a ball, moored in 4 fathoms water, with the lighthouse bearing about S. $\frac{1}{4}$ W., distant 4½ miles, and the channel by eight conical buoys, painted white, on the starboard, and seven can buoys, painted black, on the port hand, entering.

Fishing stakes.—There are fishing stakes on both sides of the channel.

General chart, 1,355 [2,513].

* A light buoy, painted black, showing a *white occulting* light, with a period of system of *twenty seconds*, showing light *ten seconds* and eclipse *ten seconds* to be established, 1906.

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Chart, 1,353 [2,514]. Var. 0° 10′ E.

Tides.—It is high water, full and change, at one hour; springs rise 7 feet.

Tidal streams.—The streams run at the rate of 2½ knots in the river.

Directions.—The fairway buoy should be approached from a north-easterly direction, whence the channel is between the buoys on either side; within, the concave side of the river should be followed, but local knowledge is necessary.

Town.—Kelambir or Tanjong Pura, about 12 miles up the river, is the capital of the province of Langkat, and the seat of government. There is a garrison, a post, and telegraph office.

Some Europeans reside here, and there are numbers of Chinese labourers, in addition to the native population.

Communication.—Communication by steam vessels is maintained regularly with Penang and with Deli every fortnight.

Trade.—The petroleum oil springs and the refining works near Langkat are in full working order, and the greater portion of the output of refined oil is sent by steamers to Penang and Singapore. In 1902 the port was entered by 417 vessels of which 400 were steamers.

COAST.—Between Langkat and Deli rivers, in the various river mouths are a number of islets, the most prominent of which is Tapakuda, about 2 miles eastward of Langkat river, which is formed of sand, thickly covered with tall casuarina trees; a shallow bank extends about one mile off it. Pulo Paho, south-east of it, is of a similar character, composed of mud and mangroves, with a single high tree and a group of others.

Lat. 4° 0½′ N. Long. 98° 32′ E.

Tapakuda river, westward of these islands, has a depth of 16 feet in its approach at high water, spring tides, in a narrow channel over the bank in which the tidal streams run with considerable strength. The small rivers between it and Deli river are nearly dry at low water, and the coast is fronted in places by a shallow bank extending to the distance of about 2 miles.

Buoys.—The channel is marked by three conical buoys, painted white, on the starboard, and three can buoys, painted black, on the port hand entering.

Ujong Batu Chamal is a rounded point situated about 6 miles northward of Deli river, and both it and ujong Ahu, westward of it, have sandy beaches, with a few casuarina trees, but these points are not easily identified.

Karang Gading is a ridge, with depths of 2½ fathoms, over hard bottom, extending from Batu Chamal, about 7 miles in a north-west direction parallel to the coast, and with depths of less than 5 fathoms for 4 miles beyond. It may be approached by the lead and generally shows discoloured water; there are numerous fishing enclosures on it.

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COAST.—General remarks.—From Batu Chamal past Deli river to Serdang river, a distance of 15 miles south-eastward, the coast consists almost entirely of mud and mangroves, but beyond Serdang river, and past ujong Sibunja Bunja, there is a considerable amount of sandy beach, with casuarina and other tall trees for 18 miles, as far eastward as the remarkable tree of Mengkudu. From Mengkudu beyond Telok Baharu there is again mud and mangroves, succeeded by sandy shores with a luxuriant growth of casuarinas, up to tanjong Tanjung (Mati). The whole is fronted by a shallow bank, varying from a half a mile to 3 miles off shore, with Deli bank and the Bunja shoals in the offing. Chart, 1,353 [2,514]. Var. 0° 10′ E.

In accordance with the more habitable character of the coast, there are, at several places close to the sea, fishing stations of some size, of which, however, but little can be seen from the offing. There are also numerous fishing stakes on the banks fronting the shore, mostly within the 3-fathoms limit, but near Bedagei they extend out to the depth of 5 fathoms.

Most of the banks can be approached by the lead, but the bank on the east side of the approach to Deli river is "steep-to," as is also that eastward of Telok Mengkudu. The depths also are somewhat irregular off this coast, and the bottom contains more stones than that farther westward.

DELI RIVER.—Belawan mouth.—Deli river lies about 6 miles southward of ujong Batu Chamal, and has two entrances, with pulo Belawan lying between them. Belawan, the northern mouth, has a depth of 7½ feet at low water, spring tides, in the buoyed channel above 2 cables in breadth over a soft muddy bottom through the mud flat which fronts the coast to a distance of over 4 miles. Within the flat the water deepens, there being from 6 to 8 fathoms abreast the town of Belawan. Vessels drawing 10 feet can enter the river at high water and the railway to the interior, makes this the principal harbour of the Deli district.* Plan, 1,353 [2,514]. Lat. 3° 48′ N. Long. 98° 43′ E.

Within the bar the sides of the channel are tolerably "steep-to"; those on the east side of the bank are of hard sand, whilst to the westward is the extensive mud bank which fronts the shore; the bottom in the fairway is mud.

The southern mouth is shallow and barred by the railway bridge which crosses it to pulo Belawan.

LIGHT VESSEL.—A light vessel, moored in 4½ fathoms water, distant 2½ miles E. ¼ S. from the trees on ujong Batu Chamal, exhibits, at an elevation of 36 feet above the level of the sea, a *white occulting* light, having a period of system of *twenty-five seconds*, showing light for *fifteen seconds*, followed by an eclipse of *ten seconds* duration; it should be visible, in clear weather, from a distance of 11 miles. Lat. 3° 54′ N. Long. 98° 43½′ E.

General chart, 1,355 [2,513].

* A new channel is to be dredged.

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Chart, 1,353 [2,514]. Var. 0° 15′ E.

Should the illuminating apparatus be under repairs a bell will be sounded, and it is reported that this bell is automatic with any motion of the vessel.

The vessel, painted red, and with "Deli" in white letters on the sides, has an iron tower supported on four legs.

Lat. 3° 48′ N. Long. 98° 41½′ E.

LIGHT.—A *white fixed* light is exhibited, at an elevation of 48 feet above high water, from a post, 42 feet in height, painted white and situated near the Research office on the north side of the river.

LIGHT BUOYS.—Two conical shaped light buoys, painted black, are moored on the port side of the channel entering.

The outer buoy, in 8 feet water, is situated N.E. by N. distant 3¼ miles from ujong Belawan, and exhibits a *white fixed* light which should be visible, in clear weather, from a distance of 6 miles.

The inner buoy, exhibiting a *white flashing* light which, in clear weather, should be seen from a distance of 6 miles, lies in 11 feet water, N.E. by E. ¼ E., distant 1¼ miles from ujong Belawan.

Buoys.—The channel into the river is marked on the starboard hand by eight conical buoys, painted white, and on the port hand entering, by eight can buoys painted black.

Submarine telegraph cable.—Telegraph cables connect Deli with Penang and Olehléh.

Pilots.—Steam vessels can obtain the services of the Harbour Master.

Outer Anchorage.—Vessels may anchor near the light vessel, or outside her, according to draught. A good position is in 9 fathoms water, with the entrance of Belawan river in line with a gap in the mountains, bearing S.W. ½ W., and about 6 miles from the entrance.

Directions.—The light vessel marks the approach to the Belawan mouth of the Deli river, from whence the channel, between the buoys on either side, up to the town, apparently presents no difficulty. Vessels of 10 feet draught can enter at any high water, but it would be advisable for a stranger to secure the services of someone acquainted with the river.

Tides.—It is high water, full and change, at 2 hours; springs rise 7 feet. High water occurs nearly 2 days after full and change and the tides are subject to diurnal inequalities.

Tidal streams.—At springs, the flood stream in the river runs at the rate of 1¾ knots, and the ebb about 2¾ knots, turning from one to 2 hours after high and low water respectively. At the light vessel the streams run from 1½ to 2 knots, across the entrance, the flood to the south-eastward and the ebb to the north-westward.

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Between Penang and Deli, it is stated that a south-easterly set, more particularly in the months of September and October, should be guarded against; this statement must be regarded with caution, as the prevailing set in the strait is in the opposite direction. Chart, 1,353 [2,514]. Var. 0° 15′ E.

Belawan.—Pulo Belawan is formed chiefly of mud and mangroves in great part flooded at high water; on the west side is the town and harbour of Belawan, and on the east the fishing village or *bagan*. Most of the Europeans reside at Labuan Deli, about 2½ miles from Belawan, or at other places near the railway line, which crosses the channel south of the island by a bridge. Lat. 3° 47′ N. Long. 98° 42′ E.

Harbour.—The harbour has depths of from 5 to 6 fathoms, but it is somewhat narrow in places, rendering it desirable to moor. There are wharves in front of the town for the use of local steamers which lie alongside them. Depths of from 5 to 6 fathoms are maintained for some distance above the town; but only steam launches and boats can now ascend to Labuan Deli.

Communication.—The Netherlands Royal Packet Company run steamers, every fortnight, to Sabang bay; to Batavia, *viâ* Muntok and Rhio, and to Singapore, and there is constant steam communication with Penang and Singapore.

Railway communication with Medan, which is the railway centre, with branches to other parts; also telephonic communication with Medan, and telegraphic communication with Tapanuli on the west coast. *See* Chapter I. page 21.

Coal and supplies.—About 400 tons of coal are kept in stock and there is a Government coal wharf, and pier with a depth of 18 feet alongside at low water. Coaling is carried on by baskets, and vessels are only allowed to take a sufficient quantity to enable them to reach the nearest coaling station.

Near the railway is an artesian well from which good drinking water is obtainable. Wood for fuel which is commonly used by the coasting steamers is obtainable, but for supplies of provisions it is necessary to send up to Labuan Deli.

Repairs.—Small repairs to hull and machinery can be effected.

Medan, the capital of Deli, and about 10½ miles from Belawan, is the headquarters of the Dutch Resident of the East coast of Sumatra, and of the chief of the military government of the district. It is a pleasant little town, laid out in orthodox Dutch fashion, with a grass medan, or plain, in the centre, surrounded by ornamental trees. There are two banks, two hotels, two clubs, and numerous houses of business; the streets, Lat. 3° 36½′ N. Long. 98° 40′ E.

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Chart, 1,353 [2,514]. Var. 0° 15′ E.

most of the shops and large houses are lighted by electricity. It owes its importance, as does also the whole district, to the extensive cultivation of tobacco. The population, in 1900, was 12,724, including 549 Europeans.

Communication.—The central railway station is at Medan, from which lines run northward to Belawan; eastward to Serdang and Bobongan (Perbuangan), about 12 and 20 miles respectively, with an extension from Lubu Pakam to Bangun Purba and another from Bobongan to Tebing Tinggi in the direction of Asahan and Batu Bara; southward to Deli Tua, a distance of 6 miles, and westward to Timbang Langkat and Selesseh.

The eastern branch is in course of construction to Aroe bay.

Telegraphic communication with all lines and telephonic communication between the town and all the different estates.

The roads in Deli are in very fair order, with substantial bridges where necessary.

Deli district is made up of three states; Deli is the centre under a sultan; Langkat to the northward under a native chief or Pangheran; and Serdang to the southward, also under a sultan; the whole being under the Dutch Resident at Medan.

Trade.—Deli, Langkat and the other tobacco growing districts are celebrated throughout the world for their fine silky tobacco leaf, especially adapted for the outside wrappers of cigars; the leading tobacco company is the Deli-Maatschappij, probably the most profitable agricultural company in the world. Tea and pepper are grown, and coffee is being planted in Upper Deli, Upper and Lower Langkat and other parts. Kerosine oil is exported in some considerable quantity from Langkat.

Shipping.—The Deli district port was entered by 633 vessels in 1902; of these, 393 were steamers.

Climate.—The health of the country may be considered good, though unseasonable weather often brings epidemics of fever and beri-beri, especially among new-comers. Isolated cases of cholera occur. The mornings are fresh and cool.

Lat. 3° 57½′ N. to 3° 42′ N. Long. 98° 53′ E. to 99° 9′ E.

OFF-LYING BANKS.—Deli Bank is the general name of the banks situated within the 10-fathoms contour line, extending from about 10 miles north-eastward of Deli light vessel to about 8 miles north-eastward of Sijengi point. It is about 22 miles in length in a north-west and south-east direction, and from 2 to 4 miles in breadth.

Bunja shoals form the south-eastern part of Deli bank, and consist of two parallel ridges of sand. The northern, with depths of from one fathom

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to 3 fathoms, is 6½ miles in length, in a north-west and south-east direction, within the 5-fathoms contour line, with a bottom of mud, and sand and shells, tolerably hard. From the least depth pulo Berhala bears E. ⅛ N. and the tall tree of Mengkudu S.S.E.; the north-east side of the bank is "steep-to." Chart, 1,353 [2,514]. Var. 0° 15′ E.

The southern ridge, with depths of from 1¼ to 3 fathoms, is 5½ miles in length, within the 5-fathoms contour line, the least depth being near its south-east end. The shallow portions of both ridges are generally marked by tidal-rips, and with any swell these will break. Between these shoals and the bank fronting the shore, rippings and discolouration of the water are frequently observed.

Buoys.—A conical shaped buoy, painted black and white in vertical stripes, and surmounted by a staff and black ball, is moored in 3½ fathoms water near the north-west extreme of the outer shoal; from it pulo Berhala bears E. ¼ S. and the tall tree of Mengkudu S.S.E. ⅜ E.

The south-east extreme of the southern shoals is marked by a conical shaped buoy, painted black and white in horizontal stripes, and surmounted by a staff and white ball; it is moored in 2½ fathoms water, with pulo Berhala bearing E. ⅞ N. and the tall tree of Mengkudu S.S.E. ¼ E.

Clearing marks.—In the absence of the buoys, pulo Berhala peak bearing E. ½ S. leads one mile northwards of Bunja shoals, and the same object bearing E. by N. leads southward of them. The west extreme of the casuarina trees on ujong Sibunja Bunja bearing S.S.W. ⅛ W. leads westward, and bearing W. by S. ⅔ S. leads south-eastward of the shoals. It is not advisable to stand into less than 18 fathoms water when passing these banks at night.

Sijengi ridge, about 4 miles in length, lies parallel to the coast and 2 miles distant from the mouth of Sijengi river; the least depth is 1¼ fathoms, over tolerably hard sandy bottom, with depths of from 4 to 7 fathoms between it and the shore. Isolated patches of 4½ and 4¾ fathoms lie between it and Bunja shoals. Lat. 4° 40½′ N. to 4° 39′ N. Long. 99° 2′ E. to 99° 5½′ E.

COAST.—Between Deli river and tanjong Tanjung or Mati there are several small rivers, the entrances to which are passable only by small trading craft at or near high water; the most important have small lights at the entrances. Ujong Perling, 2 miles eastward of the Deli river, is overgrown with mangrove trees, off which a mud-bank dries at low water to the distance of 1¼ miles. About one mile and 3 miles eastward are mouths of the Panglima river and Perchut river respectively; both entrances are dry at low water. There is a fishing station at the mouth of the latter, and Perchut village is about 4 miles from the entrance.

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Chart, 1,353 [2,514].
Lat. 3° 42′ N.
Long. 98° 50½′ E.
Var. 0° 15′ E.

Serdang river, about 9 miles eastward of Deli river, flows through one of the Deli tobacco growing districts already described, and is about 90 yards wide in its entrance and nearly dry at low-water, spring tides in its approach; the shore bank on either side dries off about half a mile. Rantau Panjang village is situated at the mouth and higher up there are several villages on both banks.

Westward of the mouth is a strip of sandy beach, and beyond it the small river Tuan; eastward of the mouth as far as Kuru river the shore is sandy, with cocoanut trees at intervals, near which are fishing huts, and

Lat. 3° 40½′ N.
Long. 98° 55½′ E.

at 2½ miles eastward is Serdang tree, 197 feet in height, close to the shore, and forming a conspicuous mark.

Communication.—About 6 miles from the entrance to the Serdang river, and not far from the river bank, is the station of the Deli railway.

Supplies.—A few supplies are obtainable at Rantau Panjang.

Kuru, Ular and Denai rivers, from 3 to 5 miles eastward of Serdang river, are all nearly dry at low water; the two latter are about 3 cables apart; the coast eastward of Kuru river is chiefly mud and mangroves. Near Denai river is an extensive grove of trees.

Ujong Sibunja Bunja.—At one mile eastward of Denai river, the mangroves give place to a sandy beach, which continues to ujong Sebunja Bunja, with casuarina trees in places. Near the point there is a small but dense wood of these trees which serve to distinguish it in the offing. The bank dries off here about 1½ cables only, and there is a depth of 3 fathoms at about three-quarters of a mile off shore. Patches of 4½ fathoms, with deeper water around, lie about 2 miles off.

Perbuangan river, dry at low water in its entrance, which is about 50 yards in breadth, lies close eastward of ujong Sibunja Bunja; between, within the hook of the point, is a shallow and muddy lagoon about one mile in length; there is a fishing station near the western entrance point.

Communication.—A bad road leads through tobacco plantations to the Perbuangan station of the Deli railway, distant about 5½ miles in a direct line.

Sijengi river.—From the Perbuangan river, the coast is sandy to Sijengi point, which point is marked by some casuarina trees; some villages lie within the point, but are not visible from seaward. The shore bank dries off about 3 cables. Sijengi ridge is described on p. 103.

Telok Mengkudu.—Between Sijengi river and Mengkudu tree, 8 miles eastward, the coast, fronted by a sandy beach, forms a slight bight,

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known as Telok Mengkudu, into which discharge the Baharu, Pa Nipa, and Mengkudu rivers, all small streams, which dry at low water, and have mud and mangroves at their mouths; there are villages near all these rivers. Chart, 1,353 [2,514]. Var. 0° 15′ E.

Mengkudu tree is 220 feet in height and visible in the offing from a distance of about 18 miles; its roots are being undermined by the sea, and it may possibly be down in a few years; within it, however, there are other tall trees, but of less height. Lat. 3° 33¾′ N. Long. 99° 10′ E.

Depths off shore.—The depth in Telok Mengkudu is 3 fathoms at 2½ miles off shore; off the tree there is the same depth at 1½ miles off.

BEDAGEI RIVER, 4½ miles south-eastward of Mengkudu tree, is a third of a cable wide in its entrance, with a depth of one foot at low water, spring tides, over the bank in its approach. There is a little beach on either side of the mouth of the river; and from the offing, a high wood just eastward of the river, and some groups of trees farther eastward, serve to identify it. A hulk is moored in the roadstead. Lat. 3° 31′ N. Long. 99° 14′ E.

Depths off shore.—The shore mudbank dries off to the distance of 3 cables, and the depth is 3 fathoms at one mile off shore.

PADANG RIVER.—From Bedagei river to Padang river, 5 miles south-eastward, the coast is all mud and mangroves. Padang river is 4 cables wide in its estuary, and has a depth of 1½ feet at low-water, spring tides, over the bank in its approach; the eastern point of the river has a small sandy beach, and the channel is half a cable in breadth.

LIGHT.—A *white fixed* light is exhibited, at an elevation of 46 feet above high water, from an iron framework support, 42 feet in height, painted white and situated on the southern side of the entrance to Banda Kalipa; it should be visible, in clear weather, from a distance of 12 miles, between the bearings of S. 68° W., through south, to S. 29° E. Lat. 3° 27½′ N. Long. 99° 18¾′ E.

Beacons.—The channel, as far up as the settlement, is marked, on the starboard side, by beacons surmounted by balls, and on the port side entering, by beacons surmounted by crosses; the outer beacons are about half a mile north-north-eastward of the mouth.

Settlement.—The settlement is situated about half a mile above the entrance, on the western bank. Coasting steamers and other trading craft call here in connection with the tobacco plantations situated farther inland.

Fishing stakes.—On the coast bank there are several large fishing enclosures extending into a depth of 5 fathoms.

Tides.—Springs rise 7 feet.

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Chart, 1,353 [2,514]. Var. 0° 15′ E.

Paguruwan river, 2½ miles south-eastward of the Padang river, with a mangrove coast between, is 5 cables wide in its entrance, which being open is easily discerned from the offing, one mile above the entrance, abreast the settlement on the eastern shore; it is 1½ cables wide. The depth is 1½ feet at low water, spring tides, in the channel over the bank fronting it. A conspicuous tree, 190 feet high, stands on the east point of the entrance.

Lat. 3° 25′ N. Long. 99° 19½′ E.

LIGHT.—Near the Custom house at the settlement, on the south side of the entrance, an iron lattice structure 42 feet in height and painted white, exhibits, at an elevation of 49 feet above high water, a *white group occulting* light with a period of system of *thirty seconds*, showing light, *three seconds;* eclipse, *three seconds;* light, *twelve seconds;* eclipse, *twelve seconds;* it should be visible in clear weather, from a distance of 12 miles between the bearings of S. 7° W. and S. 40° W.

Beacons.—The channel is marked by beacons on either side as far as the settlement, the outer one being about half a mile seaward of the mouth. At night, by steering for the light, when bearing S.S.W., will lead to the outer beacon.

Trade.—Small coasting steamers and other trading craft call here in connection with the tobacco plantations situated inland. In 1902 the port was entered by 69 steamers.

Pare Pare river, 3 miles south-eastward of Paguruwan river with a mangrove coast between, is about 5 cables wide in its estuary, which is known as Telok Baharu, and has a least depth of 1½ feet at low water, spring tides, over the bank in its approach; the small settlement named Baharu, with but little trade, is not visible from seaward. The shore mud-bank dries off about 4 cables between the Paguruwan and Telok Baharu, decreasing eastward towards tanjong Tanjung to one cable, where it is sand.

Beacons.—The west side of the channel is marked by stake beacons, the outer one being about 3 cables northward of the east point.

COAST.—From about one mile eastward of Telok Baharu, the coast gradually changes from mud and mangroves to a sandy beach with casuarina trees in places.

Chart, 794 [2,519].

Tanjong Badak Mati, 4 miles south-eastward of Pare Pare river, is almost entirely composed of sand, and distinguished by a long row of casuarina trees. The small settlements on this coast are not visible from seaward.

Lat. 3° 21′ N. Long. 99° 29′ E.

Tanjong Tanjung (Mati point).—About 3½ miles south-eastward of Badak Mati is tanjong Tanjung, a somewhat prominent

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Chart, 794 [2,519].
Var. 0° 15′ E.

point, beyond which the coast turns sharply to the southward. The coast between has a sandy beach, and it is less densely covered with vegetation than that farther westward; at about half a mile westward of the point there is a clump of casuarina trees, and the same distance beyond is a clump of cocoanut trees.

Tanjung river, entering the sea at tanjong Tanjung, is about 150 yards broad at its entrance, which has a depth of 6 inches at low water, spring tides; the eastern entrance point is thickly wooded with tall trees close down to the beach; at about one mile southward of it the sandy shore again gives place to mangroves. A portion of the coast bank, forming the east side of the channel to the river, covers at high water, spring tides, and off the point the bank dries about 3 cables, and is "steep-to" beyond. The tidal streams cause a race here.

Beacons.—The channel is marked by stake beacons.

Settlements.—There is a small settlement near the entrance, and several European tobacco plantations at about 4 hours' journey up stream. A small coasting steamer from Asahan river calls here monthly.

Anchorage.—There is fairly good anchorage westward of the point in from 7 to 10 fathoms water, with the casuarina wood bearing S. by E. $\frac{1}{8}$ E.

Mati bank, the western extreme of which is about 2 miles northward of tanjong Tanjung, lies parallel to the coast, and is about 8 miles in length, one mile in breadth, with a least depth of $1\frac{1}{2}$ fathoms near its western end, from which Badak Mati bears W. $\frac{1}{4}$ N., and Tanjung river S.W. by W. $\frac{5}{8}$ W. It is composed chiefly of hard sand, and is "steep-to" in places.

Lat. 3° 23¼′ N. to Lat. 3° 19′ N.
Long. 99° 29¼′ E. to Long. 99° 36¼′ E.

Clearing marks.—The group of casuarina trees westward of Tanjung river, bearing S.S.W. $\frac{1}{2}$ W., leads half a mile westward of the 3-fathoms edge of the bank. There is deep water inshore of it, but a patch of $2\frac{1}{4}$ fathoms lies nearly in mid-channel.

Outer Mati bank, about 15 miles in length in a north-west and south-east direction, with a greatest breadth of 5 miles, has general depths of from $5\frac{1}{2}$ to 9 fathoms, with one patch of $4\frac{3}{4}$ fathoms, from which tanjong Tanjung bears S.W. $\frac{1}{2}$ S. distant $7\frac{1}{2}$ miles; the bottom consists of mud and sand and shells; the mud being mainly volcanic ashes. Some discolouration is observable during the strength of the tidal streams.

Tides.—It is high water, full and change, at tanjong Tanjung at 3 hours, spring rise about 7 feet.

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Chart, 794 [2,519]. Var. 0° 15′ E.

Tidal streams.—The flood or south-eastern stream runs from about 4 hours before until 2 hours after high water, and the ebb the reverse, at the rate of 2 to 3 knots at springs, respectively.

Lat. 3° 46¾′ N. Long. 99° 30′ E.

PULO BERHALA (VARELA), lying about 22 miles north-eastward of Bedagei river, the nearest part of the island of Sumatra, is a capital landmark, being visible from a distance of about 30 miles in clear weather. By night also it can usually be distinguished at a fairly safe distance.

Composed of rock thickly covered with vegetation, it is about 760 yards in length, in a north-east and south-west direction, by 660 yards in breadth, and the tops of its trees, near the north-west end, are 590 feet above high water.

It is "steep-to" on the north-east and south-west sides, with 26 fathoms water at a short distance, but the 10-fathoms contour line is distant about 6 and 8 cables respectively from the north-west and south-east sides.

A wooded islet, 157 feet above high water to the top of its trees, lying three-quarters of a cable from its south-east point, is connected with the island by a coral ridge dry at low water, and at half a mile north-west of Berhala is a similar rocky islet, which shows white in places, and is 167 feet in height to the top of its trees; there is a somewhat large grotto in it. Between Berhala and this islet there are from 5 to 7 fathoms water, and depths of 6 to 8 fathoms extend 2 cables eastward of it.

A coral reef, extending from half a cable to one cable, fronts the south sides of Berhala and has two sandy beaches separated by a rocky point, the eastern one of which affords the best landing; on the western beach a stream of water discharges in the rainy season. Natives of Sumatra visit the island from time to time to collect turtles' eggs.

Anchorage.—On that portion of the ridge extending south-eastward of Berhala, anchorage may be obtained in 9 fathoms water, over sand and shells, with the summit of the island bearing N.W. by W. ⅛ W., and at about 4 cables from the nearest point of the island.

This ridge extends north-westward of the island, and includes Berhala bank. Five miles south-westward of Berhala is another ridge, with a minimum depth of 8 fathoms.

Chart, 1,353 [2,514].

Berhala bank, within a depth of 10 fathoms, is about 7 miles in length in a north-west and south-east direction by about one mile in breadth. The least water is 6 fathoms, with pulo Berhala bearing S.S.E. ¼ E. distant about 10 miles. It affords good anchorage over mud and sand. Northward of the bank, and connected with it, is another

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ridge with depths of 10 to 15 fathoms. The water is discoloured over the banks during the strength of the tidal streams, and there are occasional tidal rips. Chart. 1,353 [2,514]. Var. 0° 15′ E.

Tides.—It is high water, full and change, at 2 h. 45 m.; springs rise 7 feet.

THE BROTHERS are situated 26 and 29 miles south-eastward of pulo Berhala, in the track of vessels navigating along the coast of Sumatra. They are visible from 18 to 22 miles in clear weather, and being "steep to" beyond the distance of about 1½ cables, would usually be seen at night in time to avoid them. They are uninhabited, but natives from Sumatra usually visit them in the turtle season. Chart, 794 [2,519].

Pulo Pandang, the northern, is a thickly wooded rocky islet about 820 yards in length, consisting of two parts, the northern 223 feet, and the southern 121 feet, above high water, connected together by a sandy ridge. The islet is surrounded by a reef to the distance of 1½ cables in places, with some rocks above water on it. Lat. 3° 25¾′ N. Long. 99° 45½′ E.

Landing.—The best landing place, when there is no north-westerly swell, is on the small beach in the middle of the west side of the northern portion of the islet.

Water collects in a pit, near the landing place, during rains.

Anchorage.—On the ridge extending south-eastward of the islet a depth of 10 fathoms will be found at 6½ cables from it, but the holding ground is bad, and the sides of the ridge "steep to."

Anchorage, however, may be obtained south-east or north-west of the islet, in 14 to 16 fathoms, over mud and sand, with the islet distant about 9 cables in both cases. On either side of these ridges, of which the islet forms the centre, there are depths of over 30 fathoms.

Near the ridge connecting the two portions of the islet is a small creek where a boat may anchor.

Salanama, the southern Brother, lies about 5 miles, S.S.W. from pulo Pandang, and N. by W. distant 10 miles from tanjong Timbun Tulang. It is 850 yards in length, 330 yards in breadth, and the tops of its trees attain a height of 298 feet above high water. The island is densely wooded with trees and ferns, and its rocky sides rise steeply from the sea. Lat. 3° 21′ N. Long. 99° 43½′ E.

A rock, 26 feet above high water, lies about 1½ cables northward of the islet, and one 39 feet above high water is situated 4½ cables east-south-east from its south point; beyond the distance of a cable the islet and rocks are free from danger.

Landing.—A small beach, covered at high water, on the south-east side, offers the most practicable landing.

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Chart, 794 [2,519]. Var. 0° 15′ E.

Anchorage.—Temporary anchorage, in from 13 to 14 fathoms water, will be found on the south-east and north-west sides of the islet at a distance of about 7 cables, in the latter case with the highest part of the island bearing S.E. The islet affords no fresh water.

Tides.—*See* Tides, Batu Bara, page 112.

Tidal streams.—Near pulo Pandana the flood and ebb streams set S.E. and N.W. and near pulo Salanamo S.E. by E. and N.W. by W. respectively.

COAST.—General Remarks.—The character of the coast between tanjong Tanjung and Asahan river is similar to that described on p. 103; it is without exception low and covered with vegetation. The Brothers, in the offing, the mouths of the Batu Bara and Asahan, rivers and tanjongs Tanjung and Timbun Tulang, when near the coast, are the only objects readily identified. The Batu Bara and the Asahan are the only two small rivers of any importance.

Fishing stakes may be found as far off shore as a depth of 5 fathoms.

Chart, 1,355 [2,513].

Mountains (continued from p. 91).—From 45 to 50 miles within the coast the Batak mountains extend in a south-easterly direction until abreast or south-west of Sungi Panei, eastward of which there is no further trace of mountains to be seen from the offing. The most noticeable are a broad mountain ridge within Batu Bara with two flat summits, each about 7,300 feet, eastward of which is a conical peak 7,054 feet above high water, and here the range terminates. Nearer the coast is a noticeable sharp peak 5,906 feet above high water, eastward of which the height of the range increases to the Asahan range.

Lat. 2° 25′ N. Long. 99° 17′ E.

Lat. 2° 27½′ N. Long. 99° 21½′ E.

Surungan, 7,250 feet above high water, is the highest and the most south-easterly peak of the Asahan range; it is fairly sharp, sloping on the west and precipitous on the east side.

Lat. 2° 11′ N. Long. 99° 22′ E.

Kwalu range.—At 17 miles southward of Surungan, is the highest point of the Kwalu range; it is very noticeable, being conical and 7,677 feet above high water. A little eastward is a sharp-sided hummock 6.988 feet, conspicuous when bearing about South; south-eastward of it is a conical peak 6,922 feet above high water.

All the above mountains are in the independent Batak country.

Lat. 2° 5½′ N. Long. 99° 30′ E.

Gunong Si Gumpulan, with some flat summits, lie in Dutch territory. The highest peak is 6,496 feet, and the two others are 6,200 and 6,130 feet above high water.

The peaks of the Asahan, Kwalu and Bila ranges may be seen in clear weather as far south-eastward as off the Rokan river. They are usually visible in the early morning, but less so in the months of February to May than in the other months of the year.

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COAST.—Between tanjong Tanjung and Batu Bara river, a distance of 9½ miles, the coast is fronted by a white sandy beach for the whole distance, with the exception of half a mile of mud and mangroves northward of the Sungi Gambus. Chart, 794 [2,519]. Var. 0° 15′ E.

The coast bank, which dries off for a distance of half a mile or more in places, is generally firm mud mixed with sand, and may everywhere be approached by the lead, but the north-east edge of the bank off tanjong Timbun Tulang is somewhat "steep-to." The bottom consists of mud, sand, shells, rock and coral; the two last named being found chiefly near the islands.

The Gambus, Perupuk and Piai streams are only available for very small trading craft or boats, the mouths being all dry at low water. A few huts are visible from seaward, near the Gambus and Perupuk.

Batu Bara river is the common mouth of the Sungi Kanan and Sungi Kiri, two small streams which connect at the settlement of Tirem, about 6 cables above the entrance, and in the channel, over the coast bank fronting the entrance, there is a depth of 2 feet at low water, spring tides. On the eastern side of the channel the shore bank dries off about 8 cables. Vessels drawing 9 feet can enter at high water, spring tides.

LIGHT.—On the west side of the entrance a *white fixed* light is exhibited, at an elevation of 45 feet above high water, from an iron open framework 42 feet in height and painted white; it should be visible, in clear weather, from a distance of 11 miles. Lat. 3° 14½′ N. Long. 99° 35½′ E.

Beacons.—A beacon, painted black and surmounted by a ball, is placed in 1¾ fathoms water, N. ¼ W., distant 1$\frac{4}{10}$ miles from the light-house. Two leading beacons, each surmounted by a triangle, are situated on the port side entering.

The channel of the river is marked, on the starboard hand, by three beacons, painted white and surmounted by balls, and on the port hand entering, by three beacons, painted black and surmounted by truncated cones.

Fishing stakes are placed in 4 fathoms water, about 3½ miles northward of the entrance.

Settlements.—Tirem is chiefly inhabited by Chinese, and has a Custom House. The Controller of the district lives at Labuan Ruku, a short distance inland, which place is connected by a good road with Bedagei and Asahan.

Communication.—There is regular communication by steam vessels with Penang every 14 days, and some traffic by small coasting steamers.

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Chart, 794 [2,510].
Var. 0° 15′ E.

Tides.—It is high water, full and change, in Batu Bara river, at 3 hours; springs rise from 7 to 10 feet, the tides are subject to diurnal irregularities. The highest tides are reached two days after full and change, in the afternoon during February, and early in the mornings in August; the lowest, late in the afternoons in May and in the forenoons during November; the water rises half a foot, more or less, than usual.

COAST.—Between Batu Bara river and Timbun Tulang, 10 miles east-south-eastward, the sandy beach forming the coast is here and there interrupted by mud and mangroves, the whole backed by trees of uniform height. Some unimportant streams discharge here, amongst which are the Bagan Batak, 6 miles eastward of Batu Bara, and the Timbun Tulang at half a mile westward of the point of that name; their mouths dry at low water.

Lat. 3° 10½′ N.
Long. 99° 45½′ E.

Tanjong Timbun Tulang is low and wooded, and at the mouth of Timbung Tulang river there is a small fishing village, visible from seaward from a distance of about 10 miles, which serves to distinguish the point. The shore bank off this part of the coast dries nearly half a mile on an average, and 2 cables off Timbun Tulang is a sandbank which only covers at high water.

Timbun Tulang Bank extends N. by W. $\frac{5}{8}$ W. for a distance of 5½ miles, with depths of 1¼ to 3 fathoms, and in a north-easterly direction for 4½ miles; at which distance there is a ridge with from 3 to 6 feet water, over hard sand and mud, and "steep-to," necessitating caution when approaching it; coasting craft at times pass within it, there being 6 feet at low water.

Fishing stakes.—There are fishing stakes, in 4 fathoms water, to the westward of the extreme of the bank and 4 miles from the shore.

Clearing mark.—Salanama island, bearing N.W., leads one mile clear of the bank passing to the north-eastward.

Coast.—From tanjong Timbun Tulang to Asahan river the coast, chiefly composed of mud and mangroves, is uninhabited, and fronted by a bank which dries off about half a mile.

The Silau Laut creek discharges at 3½ miles south-eastward of tanjong Timbun Tulang.

SUNGI ASAHAN, 7 miles south-eastward of Silau Laut river, is half a mile wide at its entrance between tanjong Napal and tanjong Jumpul, both low mangrove points. The channel over the bank fronting the shore of the entrance to Sungi Asahan has a minimum depth of 3 feet at low-water, and about 14 feet at high-water, spring tides, over a bottom of hard sand, on a bar 2 miles northward of the entrance points.

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Eastward of tanjong Napal there is a bank, the channel between having a depth of 6 feet at low water; abreast the light there is a bar with about 15 feet at high water and 5½ miles above this and one mile below the settlement, another bar with 14 feet at high water; the general low-water depths in the river are from one fathom to 3 fathoms. Chart, 794 [2,516]. Var. 0° 20′ E.

LIGHT.—At the north end of the fishing village, situated one mile southward of tanjong Napal, a *white fixed* light is exhibited, at an elevation of 42 feet above high water, from an iron post, painted white; it should be visible, in clear weather, from a distance of 11 miles between the bearings of S. 4° E., through south, to S. 57° W., but is obscured by trees on tanjong Napal and tanjong Jumpul. Lat. 3° 1½′ N. Long. 99° 51½′ E.

Settlement.—Tanjung Balei, the chief town of the district of Asahan and residence of the Controller, is situated about 7 miles above the mouth of the Asahan, at the junction of that river with the Silau. The river here is about 90 yards wide, with low-water depths of from 10 to 15 feet, but it is very shallow just above.

Communication.—The Netherlands Royal Packet Company's steamers, running between Singapore and Deli, call about every fortnight, also frequent and regular communication by steam vessels with Penang and other ports; there is a post and telegraph station. *See* Communication, Chapter I., p. 21.

Pier.—Coasting craft can lie alongside an iron pier.

Beacons and Buoys.—The channel is buoyed and fairly straight in a N. by E. and S. by W. direction. To mark the approach, a conical buoy surmounted by a ball is moored in 3½ fathoms water, at 5 miles north of tanjong Napal.

Two leading beacons, each surmounted by a triangle, are situated on the port hand entering.

The channel is marked by five conical buoys, painted white, on the starboard hand, and six can buoys, painted black, on the port hand, entering, the outer pair lying 3½ miles N. by E. of the entrance.

Shipping.—In 1902 the port was entered by 88 vessels, of which 84 were steamers.

Jumpul bank.—The bank fronting tanjong Jumpul, the east point of entrance to Sungi Asahan, dries off about 2 miles, and the depths over Jumpul bank, which extends 6½ miles northward and north-eastward of the point, vary from 3 feet to 2 fathoms, with spots dry in places, the bottom consisting chiefly of mud, mixed with sand and shells. Westward of tanjong Napal the shore bank dries off about one mile.

It shows discoloured water, is "steep-to" on its north-eastern side, and should not be approached in a less depth than 12 fathoms.

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Chart, 794 [2,519]. Var. 0° 20′ E.

Fishing stakes.—Numerous large fishing enclosures exist on these banks, and in places close to the buoyed channel of the river.

Directions.—Coming from the westward, Salanama should be kept bearing N.W. astern, to pass northward of Timbun Tulang bank, until the fishing huts on the point of that name bear S.W. ½ W.; when the outer beacon buoy should be steered for, about S. by E. ½ E., from whence the entrance will be distinguished.

From this buoy the course is about S.S.E. for 2 miles, to the outer pair of channel buoys; thence about S. ⅞ W., between the buoys on either side. Abreast the light is the first inner bar; the two beacons, the outer surmounted by a cone and the inner by an inverted cone, southward of the fishing village, in line bearing S.S.E. ¾ E., lead over in mid-channel, in 4 feet at low water, spring tides. Local knowledge is necessary above this, and the services of a man, acquainted with the river, could possibly be obtained from Bagan, the fishing village near the lighthouse.

Coming from the eastward, tanjong Timbun Tulang should be kept westward of W. ⅔ N., which leads northward of Jumpul bank, until the beacon buoy, or the mouth of the river, bears about South, when the buoy may be steered for and directions above followed.

Tides.—It is high water, full and change, on the outer bar at 3h. 30m.; springs rise from 10 to 12 feet. At the settlement it is high water at 4 hours, springs rising about 8 feet.

Tidal streams.—Outside the bar the flood runs from S.E to S.S.E. at the rate of 1½ knots, and the ebb N.N.W. and more northerly attaining a rate of 2 knots. During neap tides the streams are weak and irregular, and overcome by the river stream. Near the outer buoy the ebb sets N.W. by N. and flood S.E. by S. In the river channel the streams set fairly straight, the ebb at times running at the rate of 3 knots.

Lat. 3° 2′ N. Long. 99° 53′ E.

COAST.—From tanjong Jumpul, the east point of entrance to Sungi Asahan, the coast trends south-eastward for a distance of 8 miles to tanjong Si Api-api, and then forms a shallow bay 20 miles wide between that point and tanjong Pertandangan. Into this bay the rivers Kwalu and Panei discharge their waters, but there are no other streams of any importance.

The coast is low, and in most places fronted by mangroves, similar to that described on p. 103; there are a few fishing huts, but few objects for identifying it. The tree within tanjong Bangsi, at the mouth of the Panei, and the village at Mendulang are conspicuous objects. The ranges of mountains, about 40 miles inland, are visible in clear weather.

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Tanjong Ludam and fishing station, with some rather tall trees lying near it, is situated about 6 miles south-eastward of tanjong Jumpul; between are the Ular, Betul, Undan, and Sarong Alang streams; the latter is the largest. Chart, 794 [2,519]. Var. 0° 20′ E.

Between tanjong Ludam and tanjong Si Api-api is the Sembilan stream, which may be known by the white beach and fishing huts at its mouth.

Banks.—The bank fronting the shore southward of tanjong Si Api-api, dries off about 2½ miles and from a half a mile to 2 miles in other places. Outside the depth of 5 fathoms the depth increases suddenly; within that depth the water is usually discoloured, especially off the mouths of the streams.

Panei bank formed by the deposits from these streams extends 10 miles off shore, and about 4 miles seaward of a line joining the points of the bay; the bottom is mud and sand and shells, large portions of it dry at low water, and numerous fishing enclosures are erected on it; being "steep-to" on its eastern side, it should be approached with caution.

Supplies.—Fruit and poultry may be obtained at a settlement about half an hour's pull up the Sarong Alang.

Anchorage may be obtained almost anywhere, according to the vessel's draught of water.

Tanjong Si Api-api is a sharp well-defined point overgrown with mangrove trees of moderate height. The Si Api-api discharges here, and is marked by two huts at its mouth and a white beach southward of it. Lat. 2° 56½′ N. Long. 99° 59½′ E.

Ledung.—From tanjong Si Api-api the mangrove coast trends southward for 11 miles to Ledung river and village, situated on the west side of entrance to the Kwalu river and marked by a depression in the line of trees; the coast is fronted by a bank, which, southward of tanjong Si Api-api, dries 2½ miles off.

A native collector of taxes resides at Ledung village, on the south side of entrance to the Ledung.

About midway between tanjong Si Api-api and Ledung river is the Chinese fishing village of Si Mendulang, on the south bank of the stream of that name, where there is a little white beach. The village, visible from a considerable distance in the offing, is a useful mark, as elsewhere there is only an occasional hut at the mouths of the several unimportant creeks on this coast.

SUNGI KWALU.—The mouth of this river abreast Ledung is 2½ miles wide, but it quickly narrows to less than one mile at the first

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Chart, 794 [2,519]. Lat. 2° 45′ N. Long. 100° 0½′ E. Var. 0° 20′ E.

bend, and within it is narrow and somewhat tortuous. The channel is not buoyed.

The bar, with a depth of 6 feet at low water, and 18 feet at high water, spring tides, lies about a mile off the western shore midway between tanjong Si Babi and tanjong Ledung.

Directions.—Coming from the north-westward, tanjong Ledung should be kept well open of tanjong Si Babi, passing about a mile eastward of the bank, south-eastward of tanjong Si Api-api, which is "steep-to." Steer about S. by W. ½ W. till tanjong Si Babi bears West, and then S.S.W. ¼ W., to pass about half a mile off tanjong Ledung across the bar, avoiding the fishing stakes. Abreast tanjong Ledung there are depths of 12 to 15 feet, above which the river has not been examined. Steam launches and small trading craft only visit it at present.

From the eastward, the course is northward of the outer buoy on Panei bank.

Lat. 2° 41′ N. Long. 100° 7′ E.

SUNGI PANEI.—The mouth of the Panei river is about 3 miles wide between tanjong Datu and tanjong Bangsi, the two low mangrove points forming its entrance, but 10 miles above it is reduced to about two-thirds of a mile, where it is joined from the westward by the Bila river. Labuan Bilik, the settlement, is situated about 2 miles above the junction, on the eastern bank of the Panei. The least depth between the sea and the settlement is 18 feet at high water, spring tides, abreast Njiri Kechil river, 4 miles above tanjong Datu.

The shores of the river are mangrove up to Berombang, and in the bight northward of tanjong Berombang Tungal, as well as south-eastward of that point, and at Kantan island abreast of Labuan Bilik. The remainder of the banks of the river are firm ground overgrown with tall trees, and steep-to. Cocoanut trees are growing on either side of the many little villages on the banks.

Channels.—The mudbank fronting the mouth, with depths of one fathom to 3 fathoms over it, extends about 12 miles northward of the entrance; its outer part is known as Panei bank. Large portions of it dry at low water: the Middle bank, about 5 miles in length, and the bank westward of it are "steep-to," and dry 6 feet. Between the banks which dry, there are four channels into the river; the main, or Panei channel, being close westward of the Middle bank.

The Panei channel has a low-water depth of 11 feet till a mile distant from tanjong Datu, the west point of the entrance, after which it decreases.

The western channel has a least depth of 7 feet, situated eastward of tanjong Perapat and tanjong Datu, but is easily navigated, the banks on both sides being "steep-to."

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The Bangsi and East channel connect northward of tanjong Bangsi, 1½ miles above which there is a bar with 3 to 4 feet water only; coasting craft use these channels occasionally. Chart, 794 [2,519]. Var. 0° 20′ E.

Buoys and beacons.—The outer buoy of Panei channel lies on the edge of the 3-fathoms contour line, and is a conical buoy painted black and surmounted by a staff and ball, from which tanjong Bangsi bears S. ½ E. and tanjong Si Api-api W.N.W.

The channel is marked on the starboard hand by seven conical buoys, painted white, and on the port hand entering, by six can buoys, painted black.

A cross beacon, painted white, with a topmark is situated near Sungi Njiri Kechil, 3 miles southward of tanjong Datu, and another at tanjong Berombang.

Fishing stakes.—There are several fishing enclosures and stakes on the banks on either side.

Settlements.—The settlement of Labuan Bilik has a population partly Malay, partly Chinese, chiefly occupied in the fisheries; the Prince of Panei resides not far above the settlement.

Labuan Batu, on the same bank, about 31 miles above Labuan Bilik, is the residence of the Controller.

Communication.—The steamers of the Netherlands Steam Packet Company call here every fortnight, and small steamers and other coasting craft carry on the trade with other parts of Sumatra and Penang, &c. *See* Chapter I., page 21.

Shipping.—In 1902 the port was entered by 30 vessels, 25 of which were steamers.

Anchorage.—The usual anchorage is near the mole of the Collector of Customs just below the settlement, where, very close in shore, there are depths of 12 to 15 feet, but vessels of that draught would have to moor head and stern.

Directions.—The entrance may be identified from the offing by the trees at Bangsi, 207 feet in height, by the fishing huts at Mendulang, and the prominent point of Si Api-api. Lat. 2° 41½′ N. Long. 100° 10′ E.

Having made the outer buoy, the course through Panei channel is about S. by W. ⅓ W. between the buoys on either side in not less than 23 feet at high water, spring tides. From abreast tanjong Datu, the west point of entrance, the track is along the western shore, avoiding the fishing stakes, and when nearing the cross beacon northward of Sungi Njiri Kechil steer to the south-eastward towards the cross beacon near tanjong Berombang, which point has two conspicuous trees at Berombang, of which the northern has a round and the southern, about 7 cables from it, a square top.

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Chart, 794 [2,519]. Var. 0° 20′ E.

When within 3 cables of the eastern shore steer along it, passing within half a cable or less of Lumut village. Here the channel is narrow, unbuoyed, and the banks westward of the track are "steep-to." Off tanjong Lumba Lumba, the turning point of the river, there is a low-water depth of 4 fathoms, whence to the settlement the northern bank must be kept. Off the settlement there are low-water depths of 2 to 2¼ fathoms. The tidal streams are strong.

There is some 3 or 4 feet more water westward of the fairway banks, which dry about 6 feet off Lumut, but it is apparently not so easy to navigate.

Tides.—It is high water, full and change, off the entrance at 3h. 30m.; springs rise from 12 to 13 feet, and at Labuan Bilik, at 4h. 30m., springs rise 14 feet.

Tidal streams.—The flood and ebb streams run for 5 and 7 hours respectively at 2 miles within the entrance, but at tanjong Lumut and Labuan Bilik the flood runs for 4 hours only, and the ebb for 8 hours, and near Labuan Batu for 3½ and 8½ hours respectively The flood, or south-east going stream, off the entrance makes at about 5 hours before high water, and attains a velocity at springs of 2¼ knots an hour, the ebb running 3¼ knots. Between the entrance points they run 3 and 4 knots respectively; off Lumut and Lumba Lumba both flood and ebb attain a rate of 4 to 4½ knots at springs; near the shore between these places there is a counter stream during the first of the flood. There is no slack water at springs.

Lat. 2° 31′ N. Long. 100° 8′ E.

Sungi Bila, which joins the Panei below Labuan Bilik, has a depth of 4 feet at low water, spring tides, in the channel between the bank fronting tanjong Berombang Tungal and the bank in the centre of its mouth; at Si Jawi Jawi, the settlement 2 miles beyond, the depth in the river is 7 feet at a distance of 200 yards off the wharf of the Collector of Customs.

Above the Settlements referred to on the Panei and Bila, the rivers are winding and in places shallow. But as the rise of tide is considerable for some distance, about 10 feet, they are available with local knowledge for vessels of light draught.

Winds.—Rain.—In addition to what has been stated in regard to the prevailing monsoons, &c., in the first chapter; in the neighbourhood of the Sungi Panei, persistent winds of some strength and duration, especially south-easterly, were more observable; during the surveying operations in the month of May, these south-east winds prevailed for several days, the direction by day being more from seaward and at night more from southward, at which time the atmosphere was slightly hazy. Sumatras were less

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frequent than more to the westward, and their direction more from south than west. Hard squalls from S.E. with rain were frequent. Rain occurred in all months, but chiefly from August to November. Chart, 794 [2,519]. Var. 0° 20′ E.

COAST.—The coast between tanjong Bangsi, at the mouth of the Sungi Panei, and tanjong Pertandangan, about 5 miles to the eastward, consists of mud fringed with mangroves, similar to the coast westward of the Sungi Panei. Between are Bakau and Luwus, small streams, at the mouths of which are a couple of fishermen's huts. Eastward of tanjong Bangsi is the conspicuous tree, 207 feet in height, before referred to.

Tanjong Pertandangan is a low mangrove point, but well defined when seen from north-westward or south-eastward. Lat. 2° 42′ N. Long. 100° 14′ E

Bank.—The shore bank dries off for a distance of 2 miles north-eastward of tanjong Pertandangan, but from thence to near tanjong Pechudian, nearly 12 miles south-eastward, it is less than a mile off shore; off tanjong Pechudian it again extends about 2 miles. From the latter point, a bank, with from 1½ to 3 fathoms water over it, extends about 10 miles northward, nearly parallel to the coast, and may be approached by the lead, but off tanjong Pechudian it is somewhat "steep-to," and should not be approached under a depth of 7 fathoms.

Sitokan.—From tanjong Pertandangan to Sitokan Kechil village, a distance of nearly 5 miles, the shore is all mangrove, with the exception of a low-water shelly beach just southward of tanjong Pertandangan and a similar beach between the Pertandangan and the Keluang, two small streams

A mangrove islet fronts the Sitokan stream, and a short distance from the entrance is the village of the same name.

Sitokan Kechil village lies 1½ miles southward of the Sitokan river, and is visible from the offing; southward of it, as far as the Tawar stream, tall trees stand close to the coast.

Tanjong Pechudian is fringed with mangroves, and as the tall trees backing this coast, when near it, decrease suddenly in height, it may be distinguished from some distance. The shore bank extends for a distance of 2 miles off the point.

Pechudian Besar and Pechudian Kechil, two small streams, discharge southward of the point and have fishing huts at their mouths and a little shelly beach; southward of the streams the shore is again fringed with mangroves.

Tanjong Penipahan, with village and stream of the same name, lies 4 miles southward of tanjong Pechudian; the village is visible from a considerable distance in the offing. The coast mudbank dries off nearly 2 miles between tanjong Pechudian and this village, decreasing rapidly Lat. 2° 28′ N. Long. 100° 21′ E.

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Chart, 794 [2,519]. Var. 0° 20′ E.

towards the latter, where it extends half a mile only, and is composed chiefly of sand and shells.

Charts, 794 [2,519]; 1,355 [2,513].

SUNGI ROKAN APPROACH.—Coast.—From tanjong Penipahan the coast, chiefly composed of mangroves, continues its south-easterly direction to the estuary of the Sungi Rokan, in which are situated the Halang islets. Several small streams discharge on the coast, but there are no points of recognition beyond the fishing huts at the mouths of the rivers Ular, Tenga, Pasir Limau Kapas, and Andam.

Some cocoanut trees, the only ones on this coast, point out the position of Pasir Limau Kapas, and are possibly a useful mark when approaching the Rokan estuary from the westward.

Halang islets, formed by the growth of the mangroves on the mudbanks filling Rokan estuary, have banks, drying at low water, extending about 4 miles south-eastward of them.

Lat. 2° 12′ N. Long. 100° 39½′ E.

Outer Halang, the northern islet, is 2 miles, and inner Halang, about 3½ miles in length in a north-west and south-east direction; southward of inner Halang, is Telok Merbau settlement, situated about 5 miles above the entrance of the Kubu river, a small stream on the main island.

Bank.—Southward of tanjong Penipahan, the shore bank dries off only about 3 cables, and the 3 and 5-fathoms contour lines, which run close together, are about 2½ miles off shore until about 2 miles southward of tanjong Hantu, where a bank, 2 miles in length and lying 1½ miles off shore, dries at low water; southward of this the water gradually shoals to the river.

Northward of the peninsula forming the eastern side of the river, the mudbank, with depths of one fathom to 3 fathoms, extends about 20 miles north-westward; between this and the southern of the Aroa islands the depths are irregular, from 3¼ to 8 fathoms, with isolated patches on which the depths are from 2¼ to 2¾ fathoms.

Between tanjong Belanda and Sungi Raja Berjamu, on the eastern side of the approach to the river, the shore bank of mud dries off about 1½ miles; there is then a gap in it, for about a mile, to the Seras stream, when it again dries to tanjong Senebui, from which it extends 2¼ miles to the northward.

Lat. 2° 18′ N. Long. 101° 0′ E.

Pulo Senebui, formed by mangroves growing on the mudbank, has a narrow passage between it and the shore, which extends the whole distance inside the latter mudbank. There is a small fishing village up the Sungi Raja Berjamu, which stream is three-quarters of a cable wide in the entrance.

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Fishing stakes.—Within the 3-fathoms contour line of the bank there are numerous fishing enclosures, and there are many fishing stakes covered at high water. Charts, 794 [2,519]; 1,355 [2,513]. Var. 1° E.

Sungi Rokan is about 5 miles wide in its entrance between Bagan Si Api-api, the principal settlement, and the western shore. It is reduced to 2½ miles abreast Labuan Tenga, some 9 miles above, and to less than one mile at tanjong Beting, 8 miles above Labuan Tenga. The shores on both sides are composed of mud and mangroves, and intersected by many small streams.

The river itself is much encumbered with banks, mostly quicksands, and the channels between them are constantly shifting, rendering navigation somewhat difficult.

Settlements.—The town of Bagan Si Api-api, fronting the eastern shore of the estuary of the Rokan, for a distance of 2 miles, takes its name from the quantity of wood for fuel (api-api) which can be obtained there; it is the residence of a Controller who is the head of the Civil government, and the inhabitants, numbering about 3,000, are nearly all Chinese engaged in the fisheries. Lat. 2° 10′ N. Long. 100° 48½′ E.

The settlement of Labuan Tenga is 9 miles, and that of Tanah Putih on the western bank about 33 miles, above Si Api-api; a native revenue officer resides at the latter settlement.

Communication.—There is communication by steam vessels every fortnight to Panch, Asahan, Deli, and monthly to Bengkalis, Siak and Singapore.

Trade.—The trade in dried shrimps and fish is carried on by small steam vessels running regularly between Bagan Si Api-api and Singapore *viâ* Bengkalis. In 1902 the port was entered by 549 vessels, of which 47 were steamers.

Anchorage.—There is a depth of 11 feet at low water, spring tides, between a half and three-quarters of a mile off the flagstaff at Bagan Si Api-api; for vessels requiring more water, a depth of 20 feet will be found from 1½ miles to about 4 miles south-eastward of the settlement. The depth is apparently not above one fathom a little higher up.

Directions.—The approach to the river is not buoyed, but the depth over the flat appears to be about the same everywhere.

From the northward the mudbank fronting the river may be approached by the lead, bringing tanjong Belanda, the slight projection of the coast northward of the settlement of Bagan Si Api-api, to bear South and steering for it. From the 3-fathoms contour line, tanjong Belanda being distant about 10 miles, a course should be shaped to pass 2 miles westward of that point,

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Charts, 794 [2,519]: 1,355 [2,513].
Lat. 2° 10′ N.
Long. 100° 48½′ E.
Var. 0° 20′ E.

which will lead in over the flats in about 23 feet at high water, spring tides (6 feet at low-water springs), and when abreast the south end of Bagan Si Api-api, haul in for it.

From the westward, having passed about 4 miles off tanjong Pechudian and tanjong Penipahan, course may be shaped to pass about 4 miles northward of the outer Halang islet and thence to the settlement.

Tides.—It is high water, full and change, in Sungi Rokan estuary at 4h. 30m., and at the town of Bagan Si Api-api, at 5h., springs rise 17 feet, neaps about 12 feet; and there are two high waters in the 24 hours.

Tidal streams.—The flood runs for 4 hours, and the ebb for 8 hours, at the rate of 5 knots at springs, at which time there is no slack water; the water rises about 4 feet in the first, 5 feet in the second, 5 feet in the third, and 3 feet in the fourth hour. The flood stream is weak during neaps.

On the mud-flat off the Rokan during springs, the tidal streams revolve against the hands of a watch; the maximum strength of the streams is from 3 to 4 miles. In the offing the stream runs south-eastward from 2 to 3 hours before to 2 to 3 hours after high water by the shore. During neaps a north stream and a south stream are noticeable, of which the first-named is the stronger and runs the longer, and two days after the quartering of the moon it is very frequently the only stream.

Bore.—From 3 days before until 3 days after full and change, the flood makes as a bore some 3 feet in height and with great noise and speed; it is a considerable danger to small trading craft and boats; and these usually wait under Labuan Tenga until the bore has passed up. Below Labuan Tenga it is not noticeable beyond a sudden rising of the water and a strong stream.

Winds.—Near and eastward of the Rokan, the winds during the survey were very variable; in April and in November and December north-west winds, with rain, were prevalent, whilst in July and August the winds for the greater part were between E.S.E. and N.E. Sumatras caused a disagreeable sea, which, however, did not last long. In July during four successive days a strong south-east wind was experienced. Rain fell in every month, the greatest rainfall being in April.

Chart, 795 [2,522].
Lat. 2° 17′ N.
Long. 101° 4′ E.

COAST.—Tanjong Senebui is the north-east extreme of the peninsula separating Sungi Rokan from Salat Rupat, from whence the coast trends south-eastward, forming the west side of approach to that strait. The whole of it from Sungi Raja Berjamu to tanjong Ketam is uniformly low and thickly wooded, overgrown with mangrove, the nipa

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palm and low brushwood. Behind the border of trees it is morass and entirely without inhabitants. Only near and westward of tanjong Senebui are signs of life apparent, owing to the fishermen from the Rokan pursuing their calling here. Chart, 795 [2,522], Var. 0° 20′ E.

Tanjong Senebui is fairly "steep-to," but to the south-eastward, between it and tanjong Ketam, the shore mudbank dries from one cable to 3 cables off shore.

Offing banks.—Between this shore and the fairway of Malacca strait, there are several mudbanks, some of which dry at low water and break occasionally; they are the continuation south-eastward of the South sands, as far as and southward of Pyramid shoal; there is no navigable channel between them, but there is one along the Sumatra shore used by trading craft. The positions of these banks will be best understood by referring to the Admiralty chart.

The bottom is fairly hard, and consists of sand, with here and there a layer of mud; the banks are all "steep-to," with sometimes a depth of 30 fathoms between them.

Bakal Tua bank, within 5-fathoms contour line, is 7 miles in length, $1\frac{3}{10}$ miles in breadth, and "steep-to" on all sides; it lies parallel to, and one mile distant from, the shore on the western side of entrance to Salat Rupat. The general depths over it are from 3 to 11 feet over hard sandy bottom, but two spots on it dry at low water. Between it and the main island is the best channel to the strait; the least water, $3\frac{1}{4}$ fathoms, is over the bar which nearly connects the south end of the bank with the shore mudbank. Lat. 2° 7′ N. to 2° 2′ N. Long. 101° 16′ E. to 101° 20′ E.

Anchorage.—Good anchorage may be obtained in from 6 to 12 fathoms water, over sand and mud, along the whole of the western shore of the entrance of Salat Rupat, and in the channel between Bakal Tua bank and the main island.

SALAT RUPAT, the strait separating pulo Rupat from the coast of Sumatra, is $4\frac{1}{2}$ miles in width at its northern entrance between tanjong Ketam and tanjong Mambol, and narrows to 2 miles in places; it is a convenient channel for steam coasting craft trading between Singapore and the extensive fishing stations in Sungi Rokan. Lat. 2° 0′ N. Long. 101° 22′ E.

Depths.—Directions.—The depths vary in the channels between the banks, and between them and the island shores on either side; southward of pulo Ketam the channel has a depth of $3\frac{1}{2}$ fathoms, and as none of the channels are buoyed the strait should not be used without having local knowledge.

The channel generally used by coasting craft is along the Sumatra coast for the whole distance, from tanjong Senebui, at the north-western approach, to tanjong Lebang at the eastern entrance, and westward of all

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Chart, 795 [2,522]. Var. 0° 20′ E.

the islands. The least depths are $3\frac{1}{4}$ to $3\frac{1}{2}$ fathoms at low water, spring tides, in two places: namely, on the bar, which nearly connects Bakal Tua bank with the coast off the west point of the west entrance, and a similar bar which connects the south end of pulo Ketam with the same shore.

Southward of pulo Ketam are Atong, Pajung, Rampang, Jentileh, and Mampu islands; in the channel between the last island and the Sumatra shore, there are depths of from 8 to 24 fathoms, and both sides are steep.

Lat. 1° 53′ N. Long. 101° 22′ E.

From pulo Ketam the water is deep in mid-channel, with a general depth of about 12 fathoms, but after passing tanjong Lebang it lies between the island shore and a shoal, about 8 miles in length, with $1\frac{1}{4}$ fathoms least water over it, which is parallel to, and about 3 miles distant from, the shore of Sumatra.

In the eastern part of the strait two patches, with about one fathom least water over them, lie about one mile off the north shore between tanjong Tegoh and Batu Panjang village; and there are also patches about the same distance off the south shore eastward and westward of Puah village, but the channel is $1\frac{1}{4}$ miles wide between them.

The channel to seaward, north-eastward of tanjong Lebang and of the bank of $1\frac{1}{4}$ fathoms referred to, and southward of an isolated shoal of $2\frac{1}{2}$ fathoms outside the coast bank of pulo Rupat, has a least depth of 4 fathoms.

Within the depth of 5 fathoms the shore banks are mostly "steep-to," and the bottom consists chiefly of mud and sand, with hard clay in places; anchorage may be taken everywhere.

Shores of the strait.—The whole of the south shore of Salat Rupat is thickly wooded, and there are no streams of any importance. The sungi Dumai, the largest, is dry at low water at its mouth, but there are depths of from one fathom to 2 fathoms within; the population is very scanty.

At 12 miles westward of tanjong Lebang is Puah village, situated in the space where the timber has been removed by burning and felling; it is visible from the strait, but Pulai Bongkok and Dumai villages, farther westward, cannot be seen. Two houses southward of tanjong Lebang, and a somewhat conspicuous tree, 4 miles westward of tanjong Lebang, are the only noticeable marks on this coast.

The coast of pulo Rupat, on the north side of the strait, from its north-east extreme to as far as tanjong Masim, is covered with low trees and brushwood and inundated at high water; within on the mainland are tall trees with which the entire island (chiefly marsh) is completely overgrown.

Lat. 1° 41½′ N. Long. 101° 37′ E.

Tanjong Tegoh is a shelving point; tanjong Lembu to the westward is marked by tall trees rising close to its extreme.

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Batu Panjang village, the small houses of which are conspicuous, lies 5½ miles westward of tanjong Tegoh; elsewhere the coast is uninhabited, but here and there a few huts may be seen, which form the temporary dwelling place of a few Chinese or Malays who come here to cut timber. The small streams are of no importance. The islands in the strait are all covered with tall trees.

Chart, 795 [2,522]. Lat. 1° 42½′ N. Long. 101° 31½′ E. Var. 0° 20′ E.

Trade.—Some small coasting steamers use the strait, trading between Singapore and Bagan Si Api-api in Sungi Rokan, as before stated, *viâ* Bengkalis and Siak; occasionally small sailing vessels come here to cut and carry away timber, otherwise there is but little traffic through Salat Rupat.

Tides.—The tides are semi-diurnal, and the highest water is from one to two days after full and change of the moon.

It is high water, full and change, in the west entrance of Salat Rupat at about 5h. 45m.; southward of the island at about 6h.; and at tanjong Lebang in the east entrance at 6h. 30m.; springs rise about 12 feet in the west entrance and from 8 to 9 feet in the eastern entrance.

Tidal streams.—In the strait, the flood stream sets south-east, and the ebb stream north-west; the eastern entrance to the strait the flood sets east-south-east, and the ebb west-north-west southward of the island; in the strait by Dumai village, the ebb stream runs for from 7 to 8 hours, and the flood from 4 to 5 hours at full and change, the greatest rate of the former being 3 knots and of the latter 2 knots; at the entrances of the strait the rate is about 2 knots.

PULO RUPAT, and **PULO MEDANG** lying northward of it, are separated by Salat Morong, a tortuous strait about one cable wide, with depths of more than 5 fathoms, but it is of no importance to navigation; its eastern entrance has a low-water depth of 6 feet, and its western entrance 3 feet over a flat one mile wide. Both shores are thickly overgrown, and there are no inhabitants.

Together the two islands are nearly circular in shape, about 26 miles in diameter, and the greater portion of them is morass with mangrove shores and tall trees within, the tops of which are visible from a distance of about 16 miles. Pulo Rupat, with the exception of its north-west extreme, has been described with Salat Rupat.

Nion river, discharging on the north-west side of pulo Rupat, is 2 cables in breadth, and has a depth of 2¼ fathoms, in its entrance, but it is blocked by a bank upon which there is only from 2 to 3 feet water. Between the river and tanjong Mambol, at the entrance to Salat Rupat, the coast is overgrown with trees to the high-water line.

Lat. 2° 2′ N. Long. 101° 31½′ E.

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Chart, 795 [2,522]. Var. 0° 20′ E.

Pulo Medang.—Settlements.—The greater portion of pulo Medang is low and wooded close down to the shore, which is composed chiefly of mangroves; on the north-eastern side there are some sandy beaches, casuarina trees and small villages in places; of these latter Batu Mamong, 3 miles northward of Salat Morong, is inhabited chiefly by Chinese, and one mile and 4 miles respectively from this are Kuku-Burung and Makerau, and there is a hut on tanjong Punah. Off the north-west coast there are small fishing settlements on pulo Burung, pulo Babi, and at Simpur.

Lat. 1° 59′ N. Long. 101° 46¾′ E.

Beyond the distance of a mile the north-east coast is clear of dangers, with the exception of the bank, nearly dry at low water, which extends about 1¾ miles off shore between tanjong Makerau Besar and tanjong Punah. The banks north-westward of the island will be best understood by referring to the Admiralty chart, as stated on p. 123.

Tides.—Off tanjong Medang, it is high water, full and change, at 6h.; springs rise 8 feet. Off the eastern entrance to Salat Morong it is high water, full and change, at 6h. 30m; springs rise from 8 to 9 feet.

Tidal streams.—Northward of pulo Medang the flood stream, setting east-south-east to east, runs at the rate of 2 knots, and the ebb, setting north-west to west, about 3½ knots; at neaps there is little or no south-eastern or flood stream appreciable. On the east coast of pulo Rupat the flood stream sets more to the southward, and the ebb in a more northerly direction with rates of 1½ and 2 knots respectively. Tides in Salat Rupat, *see* page 125.

Lat. 1° 41′ N. Long. 101° 53′ E.

BREWER STRAIT, seaward approach.—The approach from the northward to Brewer strait and Siak river presents no great difficulty to vessels of, and under, about 15 feet draught. The entrance, between pulo Rupat and pulo Bengkalis, is 17½ miles wide, and between the banks extending from both those islands there is a channel 3 miles in width with depths of from 8 to 16 fathoms, and over a breadth of about 6 miles there is not less than from 2¼ to 3 fathoms at low water.

Banks.—From abreast the eastern entrance to Salat Morong, a bank, with depths of from 2 to 3 fathoms, takes a general south-south-east direction for about 13 miles, its south extreme lying about 8 miles, in an easterly direction, from tanjong Masim, whence it turns directly westward for tanjong Tegoh. Southward of it, a narrow channel, with 4 fathoms water in it, separates the bank, 8 miles in length, with a least depth of 1¼ fathoms, lying parallel to the coast eastward of tanjong Lobang, and referred to on page 124.

A bank, having patches with depths of from 3¼ to 4 fathoms, extends about 18 miles to the northward of tanjong Jati, the east point of entrance,

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and 10 miles from that point it is 10 miles in breadth in a north-east and south-west direction; two patches on the bank, with depths of $2\frac{1}{4}$ and $2\frac{1}{2}$ fathoms over them, lie near the channel edge at about 5 miles north-west of the point, with other patches at the same distance north-eastward of them, and a patch with 3 fathoms water over it lies about half a mile south-west of tanjong Jati; there are no other shallow parts charted. Chart, 795 [2,522]. Var. 0° 20′ E.

Buoys.—A conical buoy, painted white, and surmounted by a staff and ball, is moored S.E. distant $4\frac{3}{4}$ miles from the eastern entrance to Salat Morong.

Can buoys, painted black, the inner surmounted by a truncated cone, are moored N.N.W. $\frac{7}{8}$ W. and W. $\frac{7}{8}$ N. distant $10\frac{1}{2}$ and $3\frac{1}{2}$ miles, respectively, from tanjong Jati.

Coast.—The western shore of the approach, on which there is but little noticeable southward of Salat Morong, has been previously mentioned, and pulo Bengkalis, on the eastern side, will be described hereafter; the coast of that island in this vicinity is of uniform appearance, and completely covered with trees and brushwood.

Between tanjong Jati, the eastern point of entrance, and 3 miles eastward of Bantan Tenga, the coast is fronted by shoal ridges running parallel to the shore, and having generally deeper water between them; they present no danger to small vessels. Lat. 1° 37′ N, Long. 101° 58½′ E.

A bank with $2\frac{1}{4}$ fathoms water over it lies $6\frac{1}{2}$ miles northward of Bantan Tenga; during the fishing season for about two weeks in the months of May and November there may be as many as five or six hundred small craft engaged here in fishing.

Directions.—The approach from the westward is along the north-east coast of pulo Medang, off which there are depths of 18 to 20 fathoms beyond the distance of one mile. From the eastward, pass on either side of Rob Roy bank, according to draught, but probably a vessel would approach Siak river from that direction *viâ* Salat Padang.

From a position about 2 or 3 miles off the village of Batu Mamong on pulo Medang, a S. by E. ½ E. course for about 10 miles, allowing for the tidal stream, should be steered, and the white buoy, south-eastward of Salat Morong, passed on the starboard hand, checking the position by bearings of tanjong Masim and Batu Mamong. If the buoy is in position a S. by E. course may be shaped to pass westward of the two black buoys on the port side of the channel and between the $2\frac{1}{2}$-fathoms patch north-west of tanjong Jati and the bank with $1\frac{1}{4}$ fathoms on the western side of the channel; thence the water is deep throughout Brewer strait. (*See* Tides, page 126.)

PULO BENGKALIS is 38 miles in length in a north-west and south-east direction, and 11 miles in breadth at its widest part, and from

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Chart, 795 [2,522]. Var. 0° 20′ E.

tanjong Jati, the west extreme to tanjong Parit, the north-east point, the north coast trending in an easterly direction for 29 miles, is wooded, and has a generally monotonous appearance; midway between these points is Bantan Tenga village, already mentioned.

Lat. 1° 31½′ N. Long. 102° 27′ E.

From tanjong Parit the coast has a south-east direction for 4 miles to tanjong Sedekip, and then turns to the southward for 13 miles to Sekudi; it is fronted by a bank of sand and mud, extending about 3 cables from the shore, the 5-fathoms contour line following the trend of the coast at a distance of about three-quarters of a mile.

The river Kembung empties itself southward of tanjong Sedekip, although for some distance inside there are depths of from 3 to 7 fathoms; there is only 3 feet of water on the bar, the entrance being a cable in breadth.

Sekudi village, situated near the south point, consists of about ten small houses; from this point a spit of less than 3 fathoms, a small portion of which dries, extends in a southerly direction for a distance of about 8 cables.

Depths off shore.—Between the east coast of Bengkalis and the Long bank in Malacca strait are a number of narrow sand-ridges, following the trend of the coast and channel, with least depths of 2 fathoms.

To the northward of the Kembung river, outside the 5-fathoms contour line, the depth rapidly increases to between 20 and 30 fathoms.

Tides.—It is high water, full and change, at tanjong Jati at 7h. 15m.; on the north coast of pulo Bengkalis at 8h.; on the east coast at 9h. 30m., where springs rise from 9 to 10 feet; neaps about 6 feet. The highest water occurs from 2 to 3 days after full and change.

Tidal streams.—In the straits, between the islands, as outside, the flood stream sets to the south-eastward, and ebb to the north-westward the latter being always the stronger, especially at neaps, when there is sometimes no flood stream; on the east coast of pulo Bengkalis, the streams sometimes attain a rate of nearly 2 knots an hour.

BREWER STRAIT, entered south-westward of tanjong Jati, where it is 6 miles in width, extends south-eastward for 17 miles to tanjong Balai, to which point it narrows gradually to about 3¼ miles; with the exception of shoals, with 3 and 4 fathoms water over them, lying about three-quarters of a mile and 2 miles respectively southward of tanjong Jati; it is deep throughout, having from 14 to 20 fathoms water.

Lat. 1° 28½′ N. Long. 102° 6′ E.

BENGKALIS.—On the north side of Brewer strait, 11½ miles south-eastward of tanjong Jati, is Bengkalis settlement; an Assistant Resident is the head of the Government, and the inhabitants are principally Chinese.

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LIGHT.—There is a wooden mole about 400 feet in length, from the extremity of which a *red fixed* light is exhibited. Chart, 795 [2,522]. Var. 0° 20′ E.

Communication.—The Netherlands Royal Packet Company's steamers, running between Singapore and Deli, call monthly, going and returning. *See* Chapter I., p. 21.

Anchorage may be obtained from one cable to 1½ cables off the mole, in from 5 to 6 fathoms water, over mud; it is recommended to moor.

Shipping.—In 1902 the port was entered by 428 vessels, of which 274 were steamers.

Coal.—There is a small Government coal depôt here.

Bukit Batu is a village built on piles, situated on the Sumatra shore of Brewer strait, at the mouth of a small river of the same name, 5½ miles westward of Bengkalis. Lat. 1° 28′ N. Long. 102° 0′ E.

Anchorage may be obtained abreast of the river in 12 fathoms water, with the town bearing W.S.W., and tanjong Jati N. by W. ¼ W.

Pulo Padang, separated from pulo Bengkalis by Salat Padang, and from Sumatra by Salat Panjang, is 32 miles in length in a north-north-west and south-south-east direction and 16 miles in breadth at its central part; off tanjong Padang, its north-west point, shoal water, with a depth of 1¼ fathoms, extends 2⅔ miles in a westerly direction, and in the bend of the coast formed between tanjong Padang and tanjong Kelamin, 8 miles to the southward, the 5-fathoms contour line is about 1½ miles off shore. Charts, 1,355 [2,513]; 795 [2,522].

The east coast of the island from the entrance of Salat Padang to the entrance of Salat Asam is fronted by a bank with a depth of less than 2 fathoms over it, extending for a distance of a half a mile to one mile off shore; a shoal, with less than 3 fathoms water over it, extends for the distance of 4 cables southward of tanjong Majung, the south point of the island, otherwise the coast is "steep-to."

Salat Padang, the channel between pulo Bengkalis and pulo Padang, leading eastward from Brewer strait, is used by small craft trading between Singapore and Sungi Rokan. It is not less than 6 cables in breadth, with depths of from 5 to 8 fathoms in the fairway throughout, and in most places there is a depth of 3 fathoms close to the shores, which are thickly wooded. At the eastern entrance the channel is contracted to a breadth of 4 cables, between the 3 fathoms contour lines, by shoals extending from each entrance point.

Dedap is a small island on the south side of the strait; the deep channel is northward of it, but there is a depth of 4¼ fathoms southward of it. Lat. 1° 20′ N. Long. 102° 22′ E.

LIGHT BUOY.—A buoy, painted white, and exhibiting a *white occulting* light with a period of system of *twenty seconds* showing light for *ten seconds* followed by an eclipse of *ten seconds*, is moored in the

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Charts, 795 [2,522], 1,355 [2,513]. Var. 0° 20′ E.

fairway of the eastern entrance to Salat Padang about 1⅓ miles south-south-eastward of the northern entrance point; vessels should pass close to the south-westward of it.

Salat Panjang, between pulo Padang and the coast of Sumatra, is entered from Brewer strait, between tanjong Padang and tanjong Balai, and has a south-south-east direction for 33 miles to tanjong Majung, the south point of pulo Padang.

It is from 1½ to 2½ miles in breadth, with fairway depths of from 8 to 13 fathoms as far as the junction of Salat Asam; but a bank about 5 miles in length, with a least depth of 5½ fathoms, lies in the fairway abreast Makapan settlement.

Lat. 0° 54½′ N. Long. 102° 22′ E.

From tanjong Majung, where it meets Salat Asam, it runs in a south-easterly and easterly direction, and is from 1½ to 2½ miles in width, its depth varying from over 20 fathoms, in the western part, to only 4 fathoms near to, and to the eastward of pulo Panjang.

On the shore of pulo Tebing Tingi, where the strait again turns to the south-eastward, and distant from it about 9¾ and 4½ cables respectively, are pulo Panjang and pulo Baru; the former is overgrown with tall trees, the latter, upon which there is low brushwood, has been lately formed, and is still increasing in the direction of its length, the bank on which it stands being about 6 miles long, parts of which dry.

From the eastern end of pulo Panjang, a narrow sandbank, following the trend of the channel, extends for a distance of 6 miles; from its eastern end and parallel to it, a bank, patches on which dry, runs to the westward for about 10 miles.

Between this ridge and the coast of Sumatra is a channel over one mile wide, with a depth of 4 fathoms.

Lat. 0° 41′ N. Long. 102° 58′ E.

On the Sumatra shore, near the eastern entrance, are three small islands collectively known as Tiga islands; from them a spit of less than 3 fathoms, half a mile of which dries, extends to the north-westward for a distance of nearly 3 miles.

From here the channel, having a width of from 8 to 10 cables and a depth of 3½ fathoms, follows the shore of pulo Tebing Tingi towards the channel leading into Salat Ayer Itam.

A patch, on which there is 2¾ fathoms water, lies in the fairway to the southward of pulo Tebing Tingi, at a distance of 7 cables from the shore.

Settlements.—On the Sumatra coast Lalang and Makapan settlements are 20 and 25 miles respectively southward of tanjong Balai, and opposite the entrance to Salat Asam, the Rawa river has a depth of 5 feet on its bar at low water, with 3 fathoms in the river within; here there are saw-mills. On pulo Padang the settlements are Dingkul, Lukit and

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Majung. Both sides of the strait are covered with tall trees, and there are small wharves where small craft ship their timber. Charts, 1,355 [2,513], 795 [2,522]. Var. 0° 20′ E.

Tides.—It is high water, full and change, at Bengkalis at 8h. 15m.; springs rise 8 feet. The tides are subject to diurnal irregularities, and the greatest rise occurs fully 3 days after full and change of the moon. The highest water is experienced during the night in May and during the day in November.

In the eastern entrance of Salat Panjang high water occurs about 3 hours later, and the rise is 4 feet greater, than at Bengkalis.

Tidal streams.—The flood stream runs in a south and east, and the ebb in a north and west direction, running tolerably regular at springs, but at neaps there is, as a rule, more ebb than flood stream; the greatest rate of the ebb recorded was 3 knots and of the flood 2 knots an hour. In the eastern part of the strait the rate is nearly 4 knots an hour.

Salat Asam, the strait between pulo Padang and Merbau and Tebing Tingi islands, varies from three-quarters to more than a mile in width, with depths of from 12 to 33 fathoms. The shores are "steep-to," except off tanjong Majung, where it joins Salat Panjang, from which point a spit, with less than 3 fathoms water over it, extends for over 4 cables to the southward. The land on either side is sparsely populated.

Tides.—It is high water, full and change, in Salat Asam at 9h. 45m.

Tidal streams run at the rate of about 2¼ knots.

SIAK RIVER, entering Salat Panjang at about 8 miles southward of tanjong Balei, is about half a mile wide at its entrance, in front of which, at the distance of 8 cables north of Liang point, the east side of the entrance, is a bar, three-quarters of a cable wide, with a depth of 15 feet at low water, spring tides, and with but little less depth for some distance on either side of that breadth. The depths within are considerable, so that all vessels which can cross the bar can reach Siak, 39 miles above the mouth, and Pakan Baru 52 miles beyond. Tebing Tingi, a small town, is 38 miles above Siak. Including boat navigation, its navigable course has been estimated at 150 miles.* Lat. 1° 14′ N. Long. 102° 10′ E.

The depths in the channels from Malacca strait are also greater than those on the bar. The best approach is eastward of pulo Medang, by Brewer strait northern approach, page 126.

Siak.—A Controller is stationed at Siak, and there is a Dutch military station; the Sultan resides on the opposite shore. The trade is mostly

* H.M.S. *Vixen* 1854, with a draft of 14 feet, ascended this river to the town of Siak. General chart, 1,355 [2,513].

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Charts, 1,355 [2,513], 795 [2,522]. Var. 0° 20′ E.

in the hands of Chinese, the natives employing themselves in the cultivation of the land. Near Siak the river has a breadth of one cable, with depths of from 11 to 12 fathoms.

Piers.—There is a pier at Siak abreast the flagstaff of the Controller, with a depth of 2 fathoms, and another at Pakan Baru with 1½ fathoms, alongside at low water.

LIGHT.—A *red fixed* light is shown from Siak pier, and a similar light, when vessels are expected from Pakan Baru pier.

Communication.—The Netherlands Royal Packet Company's steamers, running between Singapore and Deli, call here monthly, both going and returning. *See* Chapter I., page 21.

Pakan Baru.—From Siak to Pakan Baru, about 52 miles above, the river gradually narrows to about 90 yards, with depths of from 5 to 6 fathoms, and no hindrances to navigation. This place is the staple town of the forest products, and most of the trading vessels entering Siak river load here.

Trade.—The principal exports are rattans, wax, coffee, gambier, honey and tobacco, and the imports fish, manufactured goods, and petroleum.

Directions.—A bank dries at low water for a distance of 2 cables northward of tanjong Liang, the eastern entrance point, and the bar is situated 8 cables northward of that point; entering, on the flood stream, care is necessary against the strong cross set to the south-eastward. Having crossed the bar keep close along the eastern shore, where there are low water depths of 3½ to 4 fathoms as far as the eastern point of Gunting island; here the depths over the whole river increase to 4½ and 5 fathoms. Pulo Tenga (Saka), thickly wooded and situated about 5 miles above the mouth, has a mudbank, with less than 2 fathoms water over it, extending about 40 yards from its south-west side, and the channel is on the eastern side of that island.

Up to the second bend above pulo Tenga keep the western side to avoid a bank on the opposite shore; above this the depths are from 5 to 15 fathoms, the lesser depth being close to the shore, but it is advisable to follow the bends and avoid the points, as in most river navigation.

In several places the banks are about 6 feet above high river, but within them the land is marshy; both shores are wooded. Tebing Tingi village stands on a hill about 100 feet above the river.

Tides.—At the mouth of Siak river it is high water, full and change, at 8h. 30m.; springs rise 9 feet, and neaps 5 feet. Off the town of Siak the spring rise is 10 feet.

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Tidal streams.—At springs the flood stream runs for 5 hours at a rate of about 2¼ knots, and the ebb stream for 7 hours at a rate of 3 knots; at neaps the flood and ebb run for 4 and 8 hours with rates of 1 knot and 2½ knots respectively. Charts, 795 [2,522], 1355 [2,522]. Var. 0° 20′ E.

Pulo Merbau.—The north-east coast between tanjong Bohmat and tanjong Hong Kong, a distance of 9 miles, is fronted by a mudbank that dries for a distance of 2 to 3 cables from the shore; beyond this a bank, on which is a general depth of less than 2 fathoms, extends for several miles to the northward, as far as abreast the entrance to Salat Padang. Lat. 1° 8′ N. Long. 102° 29′ E.

Between this bank and that which extends off pulo Rangsang, is the fairway into Salat Ayer Itam; in the northern part of this fairway are three long narrow banks running nearly north and south, with only from 1½ to 2 fathoms water over them, making the navigation of this inlet troublesome for vessels of over 9 to 10 feet draught. The Salat Ringit separates pulo Merbau from pulo Tebing Tingi, whilst on the western and eastern sides respectively, are Asam and Ayer Itam straits.

There are a few small houses, close to the westward of the Merbau river.

Pulo Rangsang.—Tanjong Sampajan is the north point of pulo Rangsang and along the west, north, and north-east coasts of this island a mudbank dries for a distance of from 2 to 4 cables. On the north and north-east coasts the 5-fathoms contour line follows generally the trend of the coast at an average distance of about 8 miles. Lat. 1° 9½′ N. Long. 102° 44′ E.

Pulo Belembang and pulo Burung, two small islets, surrounded by several rocks above water, lie about 4 miles to the eastward of tanjong Medang Kaluwar; whilst close to the west coast is pulo Sukul. The south coast is separated from pulo Tebing Tingi and pulo Mangung by the Salat Ayer Itam.

Tides.—It is high water, full and change, on the north coast of pulo Rangsang at 10h. 0m., and on the east coast at 10h. 45m.

Salat Ayer Itam, with first a southerly direction between tanjong Hong Kong and the west point of pulo Rangsang, near which is Anak Setatah village, turns easterly and south-easterly southward of pulo Rangsang, northward of pulo Tebing Tingi and on both sides of pulo Mangung and pulo Topang. It has an average width of between 8 and 12 cables, being wider at the eastern than at the western end; the depth decreases from 27 fathoms near tanjong Hong Kong to 6 fathoms near tanjong Kemajau. Lat. 1° 3′ N. Long. 102° 36′ E.

The eastern outlet is divided into two channels by Mangung and Topang islands, one channel running east and west, the other north and

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Chart, 1,355 [2,513]. Var. 0° 20′ E.

south. The former, which is barely 3½ cables in breadth, is the deeper, the least water being 4½ fathoms in the eastern approach.

In the other and wider channel, a depth of not less than 4 fathoms can be carried by keeping close to the shore of pulo Topang, as in the centre of the channel there is a depth of only 3½ fathoms.

Lat. 0° 40′ N. Long. 103° 3′ E.

Leading into this channel on either side of the shallow bank extending to the northward of pulo Serapung and pulo Lebu are two channels, one, narrower, 3½ cables in breadth, close to pulo Tebing Tingi, leading into the Salat Panjang, the other round the south end of pulo Topang.

Two broad rivers, the Sudur on pulo Rangsang, and the Suwi on pulo Tebing Tingi, empty themselves into this strait, the depth in both of these decreasing with their breadth; several small rivers and creeks also discharge into the strait.

The western part of the strait is the most populated. There is a Chinese settlement at Tebing Tingi, westward of the Suwi river, where a Chinese lieutenant is stationed, and in other parts a few Malay villages, two of them, Beting and Belantik, being near the mouth of the Sudur river; in the eastern part of the strait are only a few scattered houses and several saw-mills.

Two steam vessels, running between Singapore and Bengkalis, make use of this strait, calling at Tebing Tingi, from where a large quantity of sugar is exported.

Lat. 1° 0′ N. Long. 102° 35′ E.

Salat Ringit, between pulo Merbau and pulo Tebing Tingi, is less than half a cable in breadth, and has depths of from 5 to 7 fathoms.

The bottom, both in these straits and outside the islands, consists principally of mud and sand, in some places there is clay, whilst off pulo Belembang and pulo Burung stones were met with.

Mangung, Topang, Lebu, Serapung and Mendol islands, are low, thickly wooded, and sparsely populated. There are some timber saw-mills scattered here and there.

Tides.—It is high water, full and change, near Tebing Tingi settlement at 10h. 0m., and at the east end of Salat Ayer Itam at 11h. 0m.; the rise gradually increases eastwards until off tanjong Medang Dalam it amounts to 13 feet. Near pulo Mangung the rise is 12 feet.

Tidal streams.—In the straits between the islands, as outside, the flood sets to the south-eastward, and the ebb to the north-westward, the latter, being almost always the stronger, especially at neaps, when there is sometimes no flood stream.

The rate of the stream, which, near the east coast of Bengkalis, runs nearly 2 knots, increases to the eastward until, near pulo Belembang and pulo Burung, it attains a velocity of 3½ knots.

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Kampar river takes its rise in the mountain range of western Sumatra, empties itself on either side of pulo Mendol, and has a channel along its eastern side, in a south-west direction, which is navigable for a distance of 18 miles from the sea as far as pulo Muda, above which navigation is difficult and dangerous; local knowledge is necessary. Owing to the bore and rapid tidal streams there is but little navigation. Chart, 2,066A [2,678]. Lat. 0° 28′ N. Long. 103° 10′ E. Var. 0° 20′ E.

Pilot.—A pilot for this river can be obtained from the village on the east side of pulo Serapung.

Tidal streams.—On the south side of pulo Mendol, at full and change, the tidal streams have rates of from 3 to 4 knots per hour.

Great Karímon island is 10 miles in length in a north-west and south-east direction; near its north end are two peaks, Jantan, 1,480 feet, and Bettina, one mile further north, 1,350 feet above high water; the remainder of the island is principally low barren land. Its southern end is separated from pulo Parit by Gelam strait, 1½ miles wide. Charts, 795 [2,522], 2,403 [2,525], 1,355 [2,513]. Lat. 1° 6′ N. Long. 103° 21½′ E.

A great number of islets, rocks, and reefs lie between the coast and the 5-fathoms contour line, especially on the south-west and north-west sides; there are also many outlying islands and islets, the principal being Little Karímon off the north-east point, Assan and Mudu on the north-west, and Temblas, Merak, and Babi on the south-west.

On the east side, the bay to the northward of tanjong Sebatak is filled by a shallow mudbank extending from 1 to 1½ miles from the shore.

The coast between tanjong Balei and tanjong Rambut and to the northward therefrom, is of a remarkable red colour.

The population of these and of the Kunder islands consists of Malays and Chinese, the former being chiefly engaged in the fisheries, and the latter principally with tillage and felling timber.

The principal villages on Great Karímon island are tanjong Balei and Pemeral, both on the south coast; off the former are several reefs that dry, extending to about a quarter of a mile from the shore.

Trade.—The chief exports are pepper, gambier, and fruit, also timber and charcoal; traces of tin have been found on the slopes of Jantan.

Settlements.—At tanjong Balei a controller of the inland government is stationed, and at Pemeral a representative of the native self-government resides; the head of the latter government lives on pulo Peniengat in Rhio strait. Lat. 0° 59½′ N. Long. 103° 26½′ E.

Communication.—Steam vessels communicate with Singapore irregularly.

Jetty.—There is a jetty at tanjong Balei, and rocks, drying at low water, extend about 2 cables from the shore.

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Chart, 2,403 [2,525]. Var. 0° 20′ E.

Buoy.—A conical buoy, painted white, is moored about 3 cables southward of tanjong Balei.

Anchorage.—There is a good anchorage in 9 fathoms water, over muddy bottom, off tanjong Balei village, near the buoy, but with no shelter from the violent westerly and south-westerly squalls that occur from April to November.

Tides.—It is high water, full and change, at 11h. 0m.; springs rise 12 feet.

Climate.—The climate is not unhealthy except in the neighbourhood of marshy ground. February is generally the driest month.

Lat. 1° 9′ N. Long. 103° 23½′ E.

Little Karímon, separated from the north-east end of Great Karímon island by a deep channel half a mile wide, is a high bold island, 2½ miles in length, rising to a height of 1,260 feet above high water without any remarkable peak; only the south-west side is inhabited.

From the north-west side a bank extends inside the 5-fathoms contour line for a distance of nearly 1¾ miles to the westward, with a least depth of 3½ fathoms.

On the south side a shallow bank, having one fathom water over it, extends in a south-south-east direction for about a mile, and beyond this it continues, in the same direction, parallel to the coast of Great Karímon for a further distance of about 10 miles, with depths varying from 3¾ to 5 fathoms; but near its southern end is a narrow ridge nearly 1½ miles in length, having a least depth of only 7 feet; this shoal spot lies with tanjong Rambut bearing S.W. by S., distant 2½ miles.

Button islet, which is small, lies in the south entrance to the strait, dividing Great and Little Karímon.

Anchorage.—There is a good anchorage during the south-west monsoon to the south-eastward of Little Karímon.

Tidal streams.—The tidal streams run strongly in the channel between Great and Little Karímon.

The Brothers, named pulo Hiju Besar and pulo Hiju Kechil, are two round islets, each 153 feet above high water, lying 2½ miles to the north-westward of Little Karímon; a rock that dries at low water lies 1½ cables west-north-west from the eastern islet. Pulo Nangoi, or the South Brother, 130 feet above high water, lies 1$\frac{2}{10}$ miles to the westward of the north-west point of the same island; and one mile south-south-west of it, and the same distance northward of Great Karímon, is pulo Tuntun, or the White rock.

Lat. 1° 11½′ N. Long. 103° 21½′ E.

LIGHT.—On pulo Hiju Kechil, an iron framework structure, 44 feet in height and painted white, exhibits, at an elevation of 131 feet

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above high water, a *white flashing* light, with a period of system of *twenty seconds* showing flash for *four seconds* followed by an eclipse of *sixteen seconds'* duration, which should be visible, in clear weather, from a distance of 17 miles. The keeper's dwelling, a white building with red tiles, stands below it. Chart, 2,403 [2,525]. Var. 0° 20′ E.

Pulo Assan, about one mile from the north-west coast of Great Karímon, is 280 feet above high water, and has on its north, west, and south sides numerous rocks and islets. Pulo Tekong Belanda, which lies about one mile from its north-west point, can be easily recognised. Chart, 795 [2,522]. Lat. 1° 8′ N. Long. 103° 18½′ E

Pulo Mudu, one mile south-south-west from pulo Assan, is 220 feet above high water, and from its south point a reef, that dries at low water, extends for a distance of about 7 cables, whilst on the western and north-western sides are dangers half a mile from the coast.

Between these islands and Great Karímon is a channel, with depths of from 6 to 21 fathoms. The highest peak of the Pulai mountains in Malacca, seen between the Brothers, bearing N.N.E. $\frac{1}{8}$ E., leads through.

Pulo Temblas, lying nearly 3 miles to the south-westward of Great Karímon, is 277 feet above high water and uninhabited; owing to its extremities being high, whilst the middle is low, it has, from a distance, the appearance of two islands. Chart, 1,355 [2,513]. Lat. 0° 59′ N. Long. 103° 18′ E.

Pulo Babi, 2½ miles southward of Great Karímon island, is 270 feet above high water, and has a bank, with from one foot to 10 feet water over it, extending 1½ miles east-north-east of it, and which is frequently marked by tidal rips; charcoal burning is carried on at the island. Lat. 0° 57½′ N. Long. 103° 21¼′ E.

GELAM STRAIT, between the Great Karímon and the Kundur islands, is used by small steamers running between Singapore and Bengkalis. The breadth of the fairway between pulo Merak and pulo Babi is about 4 cables; the depth varying from 15 fathoms at the eastern end to 4¾ fathoms south-westward of pulo Merak. Chart, 2,403 [2,525].

Buoys.—Two conical buoys, painted white, mark the north, and one can buoy, painted black, the south side of the strait. *See* Tanjong Balei, page 136.

Tides.—It is high water, full and change, in Gelam Strait at 11 hours.

Tidal streams.—The tidal streams at springs run at the rate of 3 knots an hour, the flood for 4 hours in an easterly, and ebb for 8 hours in an opposite direction.

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CHAPTER III.

MALACCA STRAIT AND ITS NORTHERN APPROACH (*cont.*)—MALAY OR EASTERN SHORE.

GENERAL REMARKS.—This chapter treats of the eastern shore of Malacca strait from Salang island (Junkseylon) to tanjong Bulus, in the western approach to Singapore.

Chart,842 [2,492].
Lat. 8° 10′ N. to 7° 46′ N.
Long. 98° 15½′ E. to 98° 27′ E.
Var. 0° 50′ E.

SALANG or JUNKSEYLON ISLAND, occupied by the Siamese of Ligor, and separated from the Malay peninsula by Papra (or Pak-Phra) strait, is about 24 miles in length, 10 miles in breadth, and divided into two Rajaships of about equal size, the northern being named Salang, and the southern Puket. The population of Salang, composed of Malays, Chinese, and Siamese, is about 33,000. The principal towns are Bandon, Tongka, Kathu and Tharúa the old capital. The north shore of Papra strait is under the Raja of Takuatung.

Salang island is rich in tin mines, which appear to have been worked for centuries back. The mining, in many places, is worked in the primitive manner the Chinese adopt, the result being that during the dry season (December to March) operations are stopped for want of water.

West Coast.—The west coast of Salang island trends nearly north and south, and has several large bays, with deep water, but none affording any protection during the south-west monsoon. The northern part of this coast is low and has wooded hills of moderate height immediately within it, with the exception of a small portion at 8 miles from the north point of the island. The southern part is a range of mountains from 1,000 to 1,750 feet above high water, thickly wooded, and sloping gradually to the northward and southward.

This side of the island is "steep-to," with depths of from 10 to 12 fathoms close to the shore. Goh Gavai, two small islands, one of which is 50 feet above high water, the other low, lie close together one mile south-westward from lem Son, which is 8 miles southward of the north-western point of Salang island, and have deep water around them.

Lat. 8° 2′ N.
Long. 98° 16½′ E.

Bandon river enters the sea just south of lem Son; on it is the town of Bandon, which contains about 100 houses.

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PAPRA or PAK PHRA STRAIT, about half a mile in width, separates Salang island from the Malay peninsula, is about 14 miles in length and much used by junks. The natives are very superstitious about this strait, its name signifying Lord's mouth. The land on both sides is mostly low and wooded, but the capes or lems are high, and within the north shore are hills of moderate elevation. A conical hill, about 200 feet above high water, lies just within lem Pak Phra. Chart,842 [2,492] Var. 0° 50′ E. Lat. 8° 11′ N. Long. 98° 16½′ E.

The narrowest part of Papra strait is between lem Hin on the continent and lem Khun on Salang island, eastward of which latter there is a sandbank dry at low water; southward of this bank the depth is 9 feet at low water, whilst there are 4 and 5 fathoms to be found on the northern, western, and eastern sides of it. Another large sandbank extends from the west side of lem Asam, on the mainland 2½ miles south-eastward of lem Hin, the channel lying between it and the bank already described.

Goh Galab, a small white rocky island, is situated 1½ miles south-eastward of lem Khun, and goh Janak is a small island lying a quarter of a mile to the south-west of goh Galah. South-westward of goh Janak there are extensive sandbanks dry at low water, and to the southward is Tamaprau river, with the town of the same name on the banks 2 miles from its mouth. Muang Mai, a larger town, is situated 1½ miles further southward, but boats cannot go beyond Tamaprau.

Bar.—The depth on the bar, at the western entrance, is subject to great changes, varying from one fathom to 3 fathoms at low water, and the channel is tortuous and difficult even for boats; the passage of the strait should not be attempted without the assistance of a pilot. Off the northern entrance point, a reef of rocks, only visible at low water, extends a short distance, and shallow and shifting sandbanks front both points.

In the south-west monsoon the sea breaks entirely across the western entrance, but in the north-east monsoon it is generally smooth.

Supplies.—Along both shores of the strait are several villages where provisions and water may be obtained.

Anchorages.—Inside the bar there is good anchorage in 5 or 6 fathoms water; and from thence to lem Khun there is a good channel for small craft with depths of from 4 to 6 fathoms at low water.

To the eastward of goh Janak and goh Galah there is good anchorage in from 4 to 5 fathoms water.

Directions.—Proceeding eastward, pass 2 cables north-eastward of goh Galah, and then steer to pass 1½ cables off lem Sai; in this part there are depths of 4 and 5 fathoms. Then steer to pass about 2 cables northward of goh Rangam Jai, a round island, like all the rest in this locality,

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Chart, 842 [2,492]. Var. 0° 50′ E.

covered with trees; between these two places the channel, which is formed between the fringing sandbanks, is little more than one cable wide, has 12 feet at low water, spring tides, and is composed of soft mud.

From goh Rangam Jai steer to pass about 3 or 4 cables southward of goh Rangam Noi, the water gradually deepening as the latter is approached; pass Sam lem or cape Three points the north-east point of Salang island, at 3 or 4 cables distant, in 7 fathoms water. Thence, pass 5 cables southward of goh Leng and 3 cables northward of goh Thanan or pulo Chupo, a small round island one mile east of Sam lem. Pass one mile eastward of goh Thanan and then, if bound to Tharúa harbour, steer between goh Ret and goh Naka Joi in about 6 fathoms water.

Tides.—The tides in Papra strait are very irregular. At the bar the times of high and low water seem to correspond nearly with those at Puket; in the middle of the strait the tides rise from 6 to 8 feet.

Tidal streams.—In the strait, the streams during the flood set in from both ends and meet at the sandbank of lem Khun, and the ebb stream runs out of both entrances to the strait. In the middle of the strait there is hardly any tidal stream, but at the western entrance the tidal streams sometimes attain the rate of 6 knots, while at the eastern entrance they have generally about half that velocity.

SOUTH COAST.—The south coast of Salang island forms Khelong bay, which is large, but has shallow water; lem Voalan is the south-west point of the bay. At nearly three-quarters of a mile southward of this point lies goh Keo Jai or Pagoda island, on the north-west point of which there are two white pagodas, and between this island and lem Voalan there is a safe passage having from 8 to 10 fathoms water.

Lat. 7° 45½′ N. Long. 98° 18½′ E.

Southward of goh Keo Jai is goh Keo Noi, another island, smaller than the former, but of about the same height and covered with trees. Besides these two islands there are five others along the south coast of Salang island, all high and wooded, with depths of from 5 to 10 fathoms round them, except along the north side of goh Khalom. The passage round the south coast between lem Voalan and goh Keo Jai, southward of goh Aú and goh Khalom, and northward of goh Hi and goh Bon, is deep.

A patch with a depth of 5 fathoms, over which there is occasionally a slight overfall, lies about a quarter of a mile southward of goh Aú; in this vicinity there may be less water.

A rock, on which the depth is 9 feet, is situated about 1½ cables east-north-eastward of the east extreme of goh Keo Jai, with its north-east point bearing N.W. by W. ¾ W.

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Khelong bay.—The Reusong and Mudong, both small rivers, discharge in the northern part of Khelong bay, and lead to large villages. Chart, 842 [2,492] Var. 0° 50′ E.

Supplies.—Fresh provisions and water may be obtained in abundance and at reasonable rates, at the villages.

Anchorage.—The best anchorage during the south-west monsoon is in 5 fathoms water, at about 3 cables northward of goh Aú.

Tidal streams.—In the passages the flood stream sets to the eastward, and the ebb to the westward, at rates of from one knot to 3 knots an hour.

EAST COAST.—Lem Phan Va, the south-eastern point of Salang island, is steep on its eastern side, but a reef, with rocks on it awash at high water, extends nearly a mile south-westward of the point. From lem Phan Va, the east coast of Salang island trends to the northward, is fronted with numerous islands, and has two harbours, namely, Puket or Tongka, and Tharúa, and between this coast and goh Jao Jai there is a broad channel. Plan 843 [2,493]. Lat. 7° 48½′ N. Long. 98° 25′ E.

Tidal streams.—In the channel above mentioned the flood stream sets to the northward and the ebb stream to the southward, at rates of from 2 to 3 knots an hour.

PUKET (or Tongka) HARBOUR.—Goh Tapaunoi, nearly half a mile in length in a north and south direction, a quarter of a mile in breadth and 250 feet above high water, lies 2 miles north-north-eastward of lem Phan Va, and about the same distance south-south-eastward of Puket harbour. Goh Tapau Jai (pulo Kapal Besar), 6½ cables long in an east and west direction, a quarter of a mile broad and 395 feet above high water, lies 3 cables westward of the south point of goh Tapaunoi; a rocky shoal, with an islet and sandbanks, extends one mile southward of the island. The best entrance to Puket harbour is between these islands. Plan 843 [2,493]. Var. 0° 55′ E.

LIGHT.—A cylindrical, brickwork tower, 48 feet in height and painted white, situated on goh Tapaunoi, exhibits, at an elevation of 187 feet above high water, a *white flashing* light, with a period of system of *twenty seconds*, showing a flash of *fifteen seconds* duration; it should be visible, in clear weather, from a distance of 15 miles. Lat. 7° 50¾′ N. Long. 98° 25½′ E.

The keeper's dwelling is painted white with a red roof.

Signal station.—There is a signal station on goh Tapaunoi.

Pulo Sirih, an island separated from the east coast of Salang by a narrow creek, which at low water is impassable even for boats, forms the north-east extreme of Puket harbour; its south-east point is named lem Atpha.

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Chart,843[2,493]. Var. 0° 55′ E.

Shoal.—A shoal, with 2½ fathoms water over it, lies nearly in the fairway of approach to the outer anchorage, with the east extreme of goh Tapau jai bearing S. by E. ⅞ E. distant 3½ cables.

Anchorages.—The harbour is divided into two anchorages by a sandy flat, over which there are depths of from 6 to 9 feet at low water, spring tides, and only small vessels go into the inner harbour, in which there is anchorage in a depth of about 2¼ fathoms; there is said to be more water than is shown on the plan.

Vessels of moderate draught anchor in from 4 to 5 fathoms water, about half a mile northward of the east extreme of goh Tapau jai.

The bottom, at both inner and outer anchorages, is mud. The harbour is open to easterly and south-easterly winds, during the prevalence of which there is a little swell.

Directions.—From off lem Phan Va proceed north-eastward until Tongka hill is seen midway between Tapaunoi and Tapau jai islands, bearing N. by W. ⅞ W., when steer for it, passing between the islands in a depth of 4 fathoms; and guarding against being set on the bank southward of goh Tapau jai: then pass eastward of the 2½ fathoms shoal and anchor as convenient in the outer harbour.

To proceed to the inner harbour bring the eastern extreme of goh Tapau jai to bear S. ⅞ E., and keeping it astern on this bearing, anchor when lem Atpha bears E. by N. ½ N.

From the south-eastward, the track recommended is southward of goh Gau and goh Dakmai. Light draught vessels may enter the harbour by passing 3 cables northward of goh Tapau noi, and thence as before directed. (*See also* Directions, page 155.)

Fishing stakes extend, in places, from the shores, and are placed on some of the shoals.

Tides.—It is high water, full and change, in Puket harbour at 10h. 10m., springs rise 9 feet, neaps 7 feet; during the south-west monsoon the day tides are higher than the night tides. In the north-east monsoon the night tides and the day tides are equal. Very little tidal stream is felt in the harbour.

Lat. 7° 54′ N. Long. 98° 23½′ E.

Towns.—Tongka, the principal place in Salang island, lies about one mile up a small creek, and is the residence of the Raja, and the only port frequented by coasting steam vessels; at high water boats can ascend to the town, but at low water the creek is nearly dry.

The buildings are mostly wooden houses with thatched roofs, but include a few of brick: the Government house, the residence of the Siamese Royal Commissioner, the stamp office for tin, the barracks and Commandant's house, and several tin-smelting houses; there is a road from

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the harbour-master's office and pier to the town. The Commandant has a force of Sikh police to maintain order amongst the Chinese miners who are sometimes troublesome; tin is exported. Chart 843 [2,493] Var. 0° 55′ E.

Six miles west of Tongka, and joined by an indifferent road, is the town of Kathu, containing about 8,000 inhabitants, principally Chinese miners.

Communication.—There is a weekly mail service between Puket and Penang, and a fortnightly mail to Rangoon and intermediate ports.

Supplies.—Fresh beef is difficult to procure, poultry and vegetables are plentiful, and can be obtained at reasonable prices. Water (not very good) is brought alongside when required, and good water can be procured from two wells, one on goh Tapau jai, the other on the northern side of Nambo point, the point north-westward of that island. Coal cannot be procured, but firewood can be purchased.

Signal Stations. — There is a signal station at the Harbour Master's office, and another on the hill above Tongka.

THARÚA HARBOUR. — Goh Maprau lies about a mile northward of pulo Sirih, and Tharúa harbour is situated in the bay between it and lem Jam. The town of Tharúa, situated 1½ miles up a small river of the same name, was formerly the residence of the Raja of Puket, who in 1859 removed to Tongka. Previous to 1796 (when Tharúa was demolished by the Burmese) it was a town of considerable importance, a large Portuguese settlement, and the harbour was frequented by numbers of European vessels; it has now, however, no trade. The ruins of a fine market street, composed of large brick buildings, and the spacious houses belonging to the Europeans who once resided here, still exist. Chart 842 [2,492]. Lat. 7° 57′ N. Long. 98° 26′ E.

The entrance to the harbour is northward of Alang Noi, an islet northward of Alang Jai.

Directions.—Entering the bay, steer to pass about half a mile to the northward of Alang Noi, in 8 fathoms water, after which the water shoals gradually to the anchorage, where there is a depth of 3 fathoms, over mud bottom, with Alang Noi bearing about E. ¾ N. and the middle of goh Maprau South. There appears to be a shoal about half a mile westward of Alang Jai; and vessels should not attempt to pass between goh Maprau and that island, as the channel is foul.

Klang Bangkrong, 2 miles northward of lem Jam, is a river leading to the old residence of the Rajah of Salang.

ISLANDS.—Goh Jao Jai or Pulo Panjang is a large island, 7 miles eastward of Salang island, belonging to the Raja of Panga.

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Chart,842 [2,492]. Var. 0° 50′ E.

The west coast of the island, which trends in a northerly direction, is of moderate height, and has in the middle a large bay named Au Lubo, in which there are depths of from 2 to 3 fathoms. In this bay are two large villages, and on the southern side of the entrance lies a small island with a group of rocks northward of it, some of which are above water; the northern part of the bay is clear of rocks. Close to the shore along this coast there are depths of from 4 to 6 fathoms. Lem Nia, the north-west point of goh Jao Jai, is a high bluff, "steep-to."

Lat. 7° 55′ N. Long. 98° 35′ E.

Au Lubaling, a shallow bay, indents the south coast, and Klang Lubaloi, a small river, flows into its northern part; one mile up the river is a village of the same name.

Goh Musang forms, at low water, the south-west point of the bay, and is connected with the main island by sandbanks and rocks, over which there is a depth of about 3 feet at high water. About 2 or 3 cables south-east from this island are some rocks about 30 feet above high water, and there is broken ground about one mile off, with depths of from 3 to 6 fathoms, but outside the depths are from 10 to 16 fathoms.

Lem Hualan, the south-east point of goh Jao Jai, is a high, bold point, with deep water close to the shore.

From lem Hualan the east coast of goh Jao Jai is high and bold, with deep water close to the shore, and has a northerly direction as far as goh Rang Nok (Bird's-nest island); thence north-north-westward it is low and sandy as far as lem Sam, its north-east point. About 3 miles north-eastward from lem Hualan is a group of rocks, of which at high water only one small point is visible about 2 feet; between the rocks and the main island are depths of 8 and 9 fathoms, and one mile outside the rocks the depth is 14 fathoms.

Lat. 8° 3¼′ N. Long. 98° 37′ E.

The north coast of goh Jao Jai takes a west-north-west direction, and is mostly low and sandy; the water along this coast is shallow, the north-west point excepted, where there is a depth of 5 to 6 fathoms close to the shore. The mountains of goh Jao Jai form one long range, from 500 to 1,000 feet above high water, extending from the north-west to the south-east point of the island.

Lat. 7° 46½′ N. Long. 98° 37′ E.

Goh Gai or East Bungo, 8¼ miles southward of lem Hualan, is a round island 100 feet above high water, covered with trees, and with deep water around it, and about 3 miles in a N. by E. direction from goh Gai is a small pointed rock, about 5 feet high, also surrounded by deep water.

Lat. 7° 49′ N. Long. 98° 32′ E.

Goh Dakmai or West Bungo, a high, square, almost perpendicular island, lies about 6 miles north-westward of goh Gai, and has deep water around it. There is a safe channel for vessels coming from

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the south-eastward and bound to Puket harbour, to the southward of goh Gai, and then in between goh Mai Tan and goh Dakmai. Chart 842 [2,492] Var. 0° 50′ E.

Goh Mai Tan or pulo Bambu, a narrow island, 1½ miles in length, of moderate height and covered with trees, lies about 4 miles east-south-eastward of lem Phan Va; at one cable off its south point there is a group of rocks partly visible, with deep water close to them, but within half a mile all round this island are depths of from 10 to 15 fathoms. The north-east coast forms a sandy bay, which affords some shelter in the south-west monsoon, in depths of 6 and 7 fathoms. The north point is low and sandy, with a rock, always visible, off its extreme. Lat. 7° 47′ N. Long. 8° 28¾′ E.

Goh Khai Nok, a small, low, sandy island, lying in the channel between goh Jao Jai and Salang island, and about 5 miles east-north-eastward of lem Atpha, has a bluff on its south side, covered with trees; it is surrounded by rocks extending to a distance of about three-quarters of a mile, of which two patches are visible, the one north-westward, the other south-eastward of the island. Lat. 7° 54½′ N. Long. 98° 31′ E.

Goh Khai Noi is smaller and lower than goh Khai Nok, from which it is separated by a channel 2¼ miles in breadth, with depths of 10 and 12 fathoms. This island is surrounded by rocks, which do not, however, extend for any distance. Lat. 7° 55¾′ N. Long. 98° 33′ E.

Goh Sob (*Sisters*) are two small, high perpendicular rocks, about 3½ miles northward from goh Lipe (a conical rock more than 100 feet above high water), and about one mile off the coast of goh Jao Jai there is deep water all round them. Lat. 8° 2′ N. Long. 98° 31½′ E.

About 4 miles to the westward of goh Sob are three other islands, goh Naka Noi, goh Naka Joi, and goh Peh; patches of rocks extend for 1½ miles north-westward of goh Naka Noi, and the south point of goh Naka Joi is foul. Between these last three islands and Salang island there is a good channel with from 4 to 5 fathoms of water.

GOH JAO NOI, about 500 feet above high water, and thickly wooded, lies to the northward of goh Jao Jai, from which it is separated by a channel from a quarter of a mile to 1¼ miles in breadth. In the western part of the channel are depths of from 3 to 5 fathoms along the goh Jao Jai shore; towards the middle of the channel the water shoals to 1½ fathoms, and in the eastern part it deepens again to 4 and 5 fathoms.

About half a mile north-westward of lem Sam (the north-east point of goh Jao Jai) is a rock about 10 feet above high water, to the southward of which are depths of 5 to 6 fathoms. Lem Sam is a very low sandy point, with a bank extending from it in a north-easterly direction; to the northward of the bank is a depth of 5 fathoms, and to the eastward of Lat. 8° 5½′ N. Long. 98° 36¼′ E.

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Chart,842 [2,492]. Var. 0° 50′ E.

it depths of 7 or 8 fathoms for about half a mile; it then shoals to 2 or 3 fathoms, filling up the space between goh Rang Nok and goh Deng (two islands about 1¼ miles to the northward of goh Rang Nok); about one mile eastward of these islands the depths are from 6 to 7 fathoms.

Lat. 8° 5′ N. Long. 98° 36¾′ E.

From lem Sai, the south-east point of goh Jao Noi, the east coast has a northerly direction for 8 miles and is nearly in line with the east coast of goh Jao Jai; about 3 cables off lem Sai, two small islands, named goh Deng, are surrounded by sandbanks and connected with the main island by a reef. To the northward of these islands the coast is perfectly clear, with depths of 5 and 6 fathoms close to the shore, and from 9 to 10 fathoms about one mile off.

About 2 miles off the east coast is an extensive group of islands, all very high and bold, and almost without exception "steep to"; the southern

Lat. 8° 3½′ N. Long. 98° 40½′ E.

of the group is named goh Ganam. Between these islands and goh Jao Jai is a channel with depths of 10 and 12 fathoms.

Tidal streams.—The flood stream in this channel sets to the northward, the ebb to the southward, at the rate of about 2 or 3 knots an hour.

The South coast of goh Jao Noi trends in a westerly direction, is mostly low and wooded, and there are large sand and mud banks extending along the whole length of it.

Lat. 8° 9′ N. Long. 98° 32′ E.

Goh Boi Jai.—The west point of goh Jao Noi is connected by a reef with a small island, goh Jung, to the north-westward of which is a large high island, goh Boi Jai, with deep water on its west side; between this island and goh Jung there is a depth of 1½ fathoms and the bottom is rocky.

Goh Boi Nai, two small, round islands, about half a mile northward of goh Boi Jai, are surrounded by shallow water, and between them there is a depth of 1½ fathoms.

Lat. 8° 10½′ N. Long. 98° 31¼′ E.

Goh Bantan, a larger island, about one mile northward of goh Boi Jai, is about 200 feet above high water, and has deep water on its west and north sides.

Lat. 8° 8½′ N. Long. 98° 33¼′ E.

Goh Plong, about one mile northward from the west point of goh Jao Noi, is surrounded by rocks and sandbanks.

Lat. 8° 11′ N. Long. 98° 36¾′ E

Lem Dakmai, the north point of goh Jao Noi, has several islands off it, but immediately to the northward are goh Doda, two high, perpendicular islands, which can be passed on either side, but the channel north of them, in which the depth is 7 fathoms, being the broader, is generally used. About one mile east from goh Doda are two high, perpendicular rocks named goh Thalu; between lem Dakmai and goh Doda there is a depth of 7 fathoms.

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Goh Broi and Goh Batang are two high, bold islands north-west of lem Dakmai; goh Broi has deep water on its north and east sides, goh Batang on its south and east sides; on the other sides of both are extensive sandbanks with shallow water. Northward of goh Doda lies a group of islands, the principal of which are goh Bantae, goh Klui, goh Chung Lat, and goh Fai Mai. Goh Bantae and Chung Lat are small, rocky islands; goh Klui and goh Fai Mai are large, high islands, bold and "steep-to." Chart 842 [2,492]. Lat. 8° 11¾′ N. Long. 98° 35½′ E. Var. 0° 50′ E.

Westward of this group is a good channel with from 7 to 10 fathoms water, leading between goh Gaman and goh Klui; this channel trends in a north-north-west direction, and is the usual passage up to Panga. Goh Klui and the island near it are similar to Thalu, being high with steep sides. Lat. 8° 14′ N. Long. 98° 36½′ E.

COAST.—In the bay to the northward of goh Jao Noi, besides many small there are three tolerably large rivers: the Kasom (Takuatung), the Panga, and the Paklan. The Jhan, which enters the Kasom about 2 miles above its mouth, is the boundary between Takuatung and Panga.

KASOM or TAKUATUNG RIVER lies at the head of the bay, within and north eastward of Salang island. The town of Kasom, the residence of the Raja of Takuatung, is situated 4 miles above the mouth of the river; a large quantity of tin is exported from Kasom. At the mouth of the river is goh Panji, a high, bold island, abreast which there are depths of from 2 to 3 fathoms in the channel between the sandbanks, whence for a short distance up are depths of 3 to 4 fathoms; the depth to the town is not stated, but a pilot is necessary. Lat. 8° 18′ N. Long. 98° 29½′ E.

Anchorage may be obtained in from 3 to 4 fathoms water, at about 2 miles from the mouth of the river.

Directions.—The Kasom river is approached from the southward to within 2 miles of its mouth, by passing between several islands; on the eastern side are goh Boi Jai and goh Bantan, and on the western side an extensive group of very high, bold islands, from 500 to 1,000 feet above high water, lying along the coast of the mainland. Goh Chanak, the largest of these islands, about 2¼ miles westward of goh Bantan, is about 2 miles in length and 500 feet above high water. The space between this group of islands and the mainland is encumbered with rocks and sandbanks, some of which are visible at low water.

Vessels bound to Kasom should, after passing pulo Sirih, on the east coast of Salang island, at about one mile distant, keep in about mid-channel between goh Chanak and goh Bantan, where there is a depth of 10 fathoms; from here a North course leads up to the entrance to the river, the water

General chart, 830 [2,473].

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Chart,842 [2,492]. Var. 0° 50′ E.

shoaling gradually. Both outside and in the mouth of the river are large sandbanks, between which a channel, with from 2 to 3 fathoms water, takes a north-north-east direction as far as, and close to, two small islands (goh Nam Sao), the only islands on the starboard side entering ; from this the channel trends north-north-westward, and is narrow.

Lat. 8° 16½′ N. Long. 98° 34′ E.

GOH MAK (Betelnut island), a low, wooded island, about 1½ miles in length and three-quarters of a mile in breadth, lying in the approach to Panga river, is surrounded on the north, west, and south sides by extensive sandbanks, and also to some little distance on its eastern side.

A flat, composed of sandbanks and rocks, parts of which are visible only at low water, extends about 4 miles southward and westward of goh Mak ; southward of this flat there is a channel, in which the depth is 1½ fathoms at low water, spring tides, but it is not often used.

Anchorage.—There is anchorage off the eastern side in about 7 fathoms water, with the rocks off goh Klui bearing about S.S.E. ⅝ E., the north side of a high and perpendicular wooded rock, E. ⅝ N. ; and the apparent north extreme of goh Mak, W. ⅛ S. The water shoals rapidly from a depth of 6 fathoms (H.M.S. *Pallas*, 1893).

Supplies.—The Raja of Panga has a house here. Poultry, vegetables, and fruit can be procured, and good water is plentiful; the best is to be obtained on the north-east side of the island, and at high water boats can go close up to the well.

Lat. 8° 19½′ N. Long. 98° 32¼′ E.

PANGA RIVER.—A wooded islet divides the mouth of the river into two channels ; the eastern is the navigable one. There is a passage to the Kasom, about 1½ miles above the entrance, and a stream equal to the Panga enters it from the eastward at about half a mile above the passage to the Kasom. The shallow water in the Panga is usually marked by a tall, reedy grass growing on it, and is, therefore, easily avoided.

Steamers of 6 feet draught can ascend the river for about 4 miles, to abreast a remarkable limestone cliff about 500 feet in height ; but here the river is barred by a sandbank, and there is only about 2 feet at low water in places, up to Panga, some 8 miles above.

Panga town is situated about 12 miles up the Panga river, or about 15 miles above goh Mak anchorage ; the valley and town are surrounded by precipitous cliffs of about 1,000 feet in height ; the valley is exceedingly fertile, and there is a considerable rainfall (May to December). The population is probably about 2,000, mostly Siamese, with a few Malays and Chinamen.

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Supplies are abundant.

Chart, 842 [2,492].
Var. 0° 50′ E.

PAKLAN RIVER lies 4 miles eastward of Panga river, and in the north-east corner of the bay; between this river and goh Mak there is a good channel with depths of from 3 to 5 fathoms.

Lat. 8° 21½′ N.
Long. 98° 36½′ E.

Off the river there is a bar with a depth of 2 fathoms at low water in the fairway, but inside there are depths of from 3 to 5 fathoms for a considerable distance. Ban Paklan, the Raja of Paklan's residence, is situated 6 miles up the river.

Directions.—Vessels approach both the Paklan and Panga rivers eastward of goh Jao Jai, and may anchor abreast goh Mak, about 4 miles below their entrances.

If proceeding for the Paklan river, from goh Mak steer to pass eastward of a small rock 20 feet above high water, lying 1¼ miles north-eastward of goh Mak, after passing which borrow on the mainland side to avoid the sandbanks extending southward from the westernmost of goh Song Phi Nong, two high, bold islands, which lie about 2 miles south-westward of the mouth of the river. Pass between the islands and then steer straight for the river.

Lem Sak, about 5 miles northward of goh Jao Noi, is high, bold land, but the point itself is low, sandy, and covered with trees. Reefs and sandbanks, partly visible at low water, extend about one mile from the point; between this point and lem Deng is a large but shallow bay.

Lat. 8° 16′ N.
Long. 98° 37¼′ E.

Lem Deng is a high, bold point 5 miles south-eastward of lem Sak; eastward of it is a bay with several high rocky islands. From lem Deng the coast of the mainland takes a south-south-east direction for about 12 miles to lem Hua Nak. In the middle of this coast is lem Din Deng, a point from which rocks extend to some distance.

Lat. 8° 13¾′ N.
Long. 98° 41¼′ E.

North-west of lem Din Deng are large groups of high, bold islands, between which and the mainland the depths are from one fathom to 2 fathoms. On these islands the natives collect edible birds' nests. From lem Din Deng towards lem Hua Nak the coast is clear, and the water deepens gradually from 3 fathoms at one mile southward of lem Din Deng, to 10 fathoms off lem Hua Nak.

Lem Hua Nak.—Islets.—Lem Hua Nak is a moderately low point covered with trees, with shallow water extending about half a cable off it. Two islets, the positions of which are doubtful, lie about one mile and 3 miles respectively south-westward of lem Hua Nak. A rock just awash at high water lies about a cable northward of the inner islet. In the fairway, between this rock and the mainland, the depths are about 12 fathoms and apparently regular.

Lat. 8° 2¾′ N.
Long. 98° 46′ E.

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Chart,842 [2,492]. Var. 0° 50′ E.

BAY OF SEVEN ISLANDS.—Eastward of lem Hua Nak is a bay about 4 miles wide by 2½ miles deep, backed by moderately high hills; there are seven islands in the bay, and its eastern side is formed by a succession of remarkable perpendicular limestone cliffs about 300 feet above high water. One of these named Banana rock, about 300 feet above high water, and situated less than half a mile within the east point of the bay, resembles a banana, and is unmistakable; it may be seen from a considerable distance, together with the high extreme of the point southward of it.

Lat. 8° 1½′ N. Long. 98° 50½′ E.

REDPOLE BAY, eastward of Banana rock point, has a low wooded shore intersected by several streams, one of which is the Ghirbi river. The head of the bay dries to about one cable off shore, with depths of about 2 fathoms a short distance beyond.

Anchorage.—H.M.S. *Redpole* anchored in a bight about half a mile across, on the western side of this bay, a few cables northward of Banana rock point. Here, in a position about midway between the entrance points and about half a mile off shore, is a depth of 3½ fathoms, with shelter from all but south-east and easterly winds. No natives were seen, but partridges, quail, and snipe were plentiful.

GHIRBI BAY.—To the southward of lem Hua Nak is a group of small islands, the largest of which are goh Damhok and goh Damgoa, both high and bold. To the south-eastward of the point the coast forms Ghirbi bay, the entrance to which is between lem Hua Nak and goh Damhok and goh Damgoa; the water shoals gradually from the entrance, to 3 fathoms at about 2 miles west-south-westward of the mouth of Ghirbi river.*

Ghirbi river is the middle of three rivers in the north part of Ghirbi bay and leads up to a town of the same name, the residence of a Raja; coal in considerable quantities is found here, but is quite unsuitable for steaming purposes.

Supplies.—There is a large export of poultry and vegetables from Ghirbi.

Lat. 7° 57½′ N. Long. 98° 56′ E.

Pakasi river, about 6 miles south-east of Ghirbi river, has depths of 4 or 5 fathoms in its mouth, but there are large sandbanks in the approach, with depths of 2 fathoms between them in a westerly direction from the river; but little is known of it.

Goh Luang.—Lem Luang is the north-west point of a large island of the same name, situated off the coast south-east of Ghirbi bay; it

* Information is much wanted on the coast lying between Ghirbi bay and Perlis river; the chart and directions must be used with considerable caution, and those without local knowledge should give this portion a wide berth.

General chart, 830 [2,473].

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is separated from the mainland by a broad but shallow strait, at the north entrance to which is an islet. Goh Luang is mostly low, but the cape is high and pointed. Westward of lem Luang the depths are from 10 to 20 fathoms, but to the northward and southward there are sandbanks. Chart,842 [2,492]. Var. 0° 50′ E.

Rocks.—Between goh Luang and goh Pipidon, 10 miles west-south-westward of it, there are said to be some rocks nearly awash at low water, spring tides.

Goh Ladujang, a large square island lying eastward and south-eastward of goh Luang, is separated from the latter and the mainland by a channel from one mile to 2 miles in breadth, with from one fathom to 3 fathoms water. Goh Ladujang is mostly low land, covered with jungle, and with but few inhabitants.

VOGEL ISLANDS, a group lying to the southward of Ghirbi bay, consists of one large island and five smaller ones. To the northward of goh Pipidon, the largest island, are two smaller ones named goh Jung and goh Mapai, the former high, the latter low.

Goh Pipidon, the largest of the Vogels, is a high wooded island, 4 miles in length in a north and south direction, by 2 miles in breadth, and apparently "steep-to" on the west side; the south and highest part forms a deep bay with 6 to 7 fathoms close in-shore. Extending about half a mile from the south-east point there is a reef surrounded by a large sandbank; this reef is always visible. Lat. 7° 46½′ N. Long. 98° 46½′ E.

Goh Pipithall, high and bold, lies about a mile to the southward of goh Pipidon, and in the channel between there are depths of from 8 to 10 fathoms; two small but high islands lie about a mile to the southward of goh Pipithall. Goh Ma, situated about 8 miles south-eastward of goh Pipidon, is a small round island, and between it and the islets southward of goh Pipithall there are two large groups of rocks covered at high water.

A patch, awash at low water, is charted nearly 3 miles, S.W. ½ W., of goh Ma, and there is a depth of 4 fathoms, the position of which is doubtful, charted midway between goh Ma and pulo Raja.

PILGRIMS, a group of five islands lying 12½ miles southward from goh Ma, are all small, whitish-looking islands, bold and apparently "steep-to," with reported depths of 20 to 24 fathoms within one mile; these depths are not borne out by the chart. They are not visible at night as clearly as the other islands along this coast on account of their white colour. The largest of the Pilgrims is named goh Ha-jai. Lat. 7° 26′ N. Long. 98° 54′ E.

PULO RAJA, situated about 10 miles southward of Salang island, attains a height of 1,064 feet above high water in the south-western part, while the north-east side is low. Lat. 7° 36½′ N. Long. 98° 22′ E.

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Chart,842 [2,492]. Var. 0° 50′ E.

Gulnare cove, at the north-west point, is about half a mile in length by a quarter of a mile in width, having a depth of 9 fathoms over sand, in the centre. There is a small inlet on the north side of pulo Raja, where a stream empties itself during the rainy season.

Overfalls.—There are heavy overfalls in the passage, nearly 5 miles wide, between pulo Raja and the Brothers islands.

BROTHERS ISLANDS, situated about 15 miles southward of Salang island, are densely wooded, "steep-to," and nearly connected by a reef. The northern island, 517 feet above high water, has a detached rock lying 3½ cables off the north extreme. The southern island, 239 feet above high water, is of nearly uniform height; a reef extends about one cable from its south point.

Lat. 7° 30′ N. Long. 98° 29′ E.

Current.—Southward of Salang island, during the north-east monsoon, the current sets north-west; during the south-west monsoon it sets south-eastward, but after strong westerly or west-north-westerly winds, the current, southward of the Brothers islands, sets to the eastward.

Lat. 7° 46′ N. Long. 99° 4′ E.

KLAT DUJANG.—Goh Tingsing, to the southward of goh Ladujang, is separated from it by a channel nearly one mile in breadth, named Klat Dujang, with reported depths of 3 to 4 fathoms. Goh Tingsing is higher than goh Ladujang and also densely wooded.

At the western entrance to Klat Dujang lies an extensive sandbank, partly dry, on the south side of which there is a passage leading seaward, with from 1½ to 2 fathoms at low water.

In the eastern entrance to this channel lies a group of islands, the largest of which is goh Krapu, high and "steep-to"; it does not appear on the chart.

Lat. 7° 37½′ N. Long. 99° 16′ E.

Klong Dujang entrance is about 15 miles southward of Klat Dujang, within pulo Lantar; no information has been received respecting it.

PULO LANTAR is a large high island (reported to be two islands) to the southward of goh Tingsing, and only separated from it by a narrow and shallow channel. The west sides of these islands extend in a line nearly north and south. From seaward they appear as one island, the narrow channel just mentioned not being visible, and the sandbanks, in the entrance of Klat Dujang, filling up the whole entrance of that channel.

Along the east sides of pulo Lantar and goh Tingsing are several small, high, and wooded islands. South-eastward of goh Rekam, the middle island of the group, about one mile distant, lies a rock which is

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always visible, resembling two square sails standing out of the water. Between these islands and the sandbanks, extending from the mainland, is a channel with depths shoaling gradually from 8 fathoms at the south point of pulo Lantar, to 3 fathoms eastward of Klat Dujang. Chart,842 [2,402]. Var. 0° 50′ E.

South-eastward of pulo Lantar lies a group of islands, one of the largest of which is koh Muk. The north-western island of this group, about 4 miles from koh Muk, is apparently about 3 miles in length ; reefs extend a short distance from its north and south points.

Koh Muk is a square high island, with a low sandy shore on its eastern side. From the mainland opposite large sandbanks extend, and between these and koh Muk, close to the island, is a channel, having, in the shallowest part, 1½ fathoms at low water, spring tides. Lat. 7° 23′ N. Long. 99° 19′ E.

Anchorage.—With koh Muk bearing West, distant one mile, it is stated that small craft may anchor in 3 fathoms water, over sand.

Koh Kadan, a long, narrow, and high island 3 miles south-westward of koh Muk, is said to have deep water on its west side ; its east side is foul, and from its south point reefs extend for several miles ; some are awash at low water, but all are covered at half tide.

Koh Libong or Pulo Telibong, a large triangular island about 20 miles south-eastward of pulo Lantar, is high on its west and south sides, and low on the north and east sides ; its summit is about 1,450 feet above high water. The island is separated from the mainland by a channel from 1¼ to 2 miles in breadth, in the western entrance to which, on the Libong side, there are depths of about 2 fathoms ; but in the eastern portion the channel is narrow, with about 1½ fathoms water, and runs between large sandbanks which dry in places ; the channel lies close along the Libong side and southward of koh Nok.

Koh Kang, a small rocky island off the south-west point of koh Libong, is connected with that island by a reef, which dries at low water. Lat. 7° 14′ N. Long. 99° 22½′ E.

CAUTION.—Off-lying shoals.—Between koh Kadan and koh Libong islands are the following dangers :—A group of rocks, awash at low water, situated with the south end of koh Libong bearing S.E. by E. distant about 5 miles.

Shoal rocky ground (marked P.D. on chart) lies with the south end of koh Libong bearing East, distant about 4 miles ; and a third shoal with the south end of koh Libong E. by N. about 3 miles. H.M.S. *Pallas*, 1893, reported these rocks to dry about 5 feet and to be situated about 1½ miles north-eastward of the charted position.

General chart, 830 [2,473].
See footnote on page 150.

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Chart,842 [2,402]. Var. 0° 50′ E.

The positions are approximate, and other dangers may exist in this locality.

Anchorage.—Good anchorage may be obtained during the north-east monsoon period, in 7 fathoms water, with the south extreme of koh Libong bearing N. by E. ¼ E., distant half a mile. Vessels should not seek shelter eastward of the point during the south-west monsoon.

Lat. 7° 18′ N. Long. 99° 28½′ E.

TARANG RIVER.—On the mainland, abreast the east coast of koh Libong, there is a large bay, into which two rivers discharge; this bay is encumbered with rocks and sandbanks, of which the greater part are visible at low water. Tarang, the northern river, may be approached either northward or eastward of koh Libong; the northern channel has about 1½ fathoms at low water as before stated; the eastern has apparently not less than about 2 fathoms as far in as the north end of koh Libong, within which the depth is also 1½ fathoms.

Tak Sua is the small fishing village on the west side of the river mouth where river pilots may be obtained. Tarang river has a general north and south direction, and apparently extends upwards of 20 miles inland; it is narrow and tortuous with from 3 feet to 4 fathoms in places at low water, spring tides. The channel is marked by beacons or stakes, available with local knowledge.

Towns.—The old town of Tarang, where the Governor formerly resided, is 13 miles up the river, and as far as that place, the river was ascended by His Siamese Majesty's ship *Regent*, drawing 10½ feet water, in September 1875. Kontani is a Chinese town 3 miles above Tarang, to which it is said vessels of the same draught could navigate in the wet season; however, only very light draught steamers use this river.

Guntan, a new town, has been built 8 miles below Tarang on the left bank, to afford greater facilities for trade, and the seat of Government has been removed to this place.

Exports.—The exports include live pigs, tin, and attaps, made from the dunny palm for roofing purposes.

Palean or Plien river enters the bay, eastward of Tarang river, and, at its entrance and for some distance up, has depths of from 3 to 5 fathoms. A steam vessel, drawing 12 feet water, can ascend about 1½ miles at three-quarters flood, at which distance there is a fishing village, and one drawing 6 feet water can proceed about 15 miles at high water; the Raja's residence is about 7 miles from the entrance.

Trade.—Tin and pepper are exported, several other minerals are also found, and coal is obtained in considerable quantities, but possibly of the same poor quality as that near the Ghirbi, p. 150.

General chart, 830 [2,473].
See footnote on page 150.

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COAST.—From koh Libong the coast trends in a south-easterly direction for about 65 miles to Perlis river, and at about 6½ miles south-south-eastward of the south point of koh Libong are two islands named Darby and Joan: a shoal lies about half a mile south, and an islet, 80 feet above high water, with rocks extending about 2 miles southward of it, about 2½ miles south-west of Darby. Chart, 842 [2,492]. Var. 0° 50′ E.

Pak Nam Lewang, a river situated about 15 miles south-eastward of koh Libong, has a number of islands and rocks off its mouth, Bold and Cut islands being the two outer; about a mile south-west of the former there is a shoal. About 12 miles south-east of Pak Nam Lewang, but separated by a point which extends some miles to the westward, is Klong Lare, and about 9 miles further in the same direction Lungu river; off this part of the coast there are several small islands. Lat. 7° 5½′ N. Long. 99° 36′ E.

Well island, about 11 miles south-west of the entrance to Klong Lare, is the largest of the outer islands, and two smaller ones lie about 2 miles south-south-westward of it. Eastward of Well island are North and South Cone islands, 438 and 456 feet respectively above high water. Lat. 6° 50′ N. Long. 99° 32′ E.

Perse rock, with 6 feet water over it, lies E. by N., distant one mile from South Cone island. Satul river is situated about midway between Lunga and Perlis rivers.

PULO MOHEA, a group consisting of two large islands and a small one, lie close together, about 17 miles south-eastward of the Pilgrims: the two large islands are wooded, 524 feet and 783 feet respectively above high water, and have deep water around them. The eastern side of these islands is "steep-to," and on this side of the southern island is a waterfall, the water falling almost from the top of the island into the sea: the south point of the southern island is high, bold, and "steep-to." Lat. 7° 13′ N. Long. 99° 4′ E.

Anchorage.—On the west side where the islands slope gradually, and abreast the north island apparently, is a sandy bay, with good anchorage, the water shoaling gradually to the shore; vessels may find good shelter here in the south-west monsoon.

Sangald (Guilder) rocks are situated 14 miles W. by S. from the south point of pulo Mohea and form a group, of which only two small points are above high water. The south rock is about 8 feet, and the north rock about 4 feet above high water; there are depths of from 30 to 35 fathoms round them. These rocks are dangerous, being hardly visible in the south-west monsoon, and there is often a very strong tidal stream running past them. Lat. 7° 9¼′ N. Long. 98° 49¾′ E.

General Directions.—Steam vessels from the south-eastward, and bound for Puket harbour, should pass between Sangald rocks and

General chart, 830 [2,473].
See footnote on page 150.

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Chart, 842[2,492]. Var. 0° 50′ E.

pulo Mohea, this being a clear channel with 25 to 30 fathoms water. When about one mile off the south point of pulo Mohea, shape a course for the north point of goh Mai Tan, passing about 4 miles westward of the Pilgrims. In this part the flood stream sets north-westward, and the ebb south-eastward ; in the offing the reverse is the case.

Chart, 793 [2,515].

Vessels proceeding in the reverse direction may, from off the south point of pulo Mohea, shape a course to pass eastward of the Butang group. Pulo Tenga, 680 feet above high water, lies in this channel nearly midway between the Butang group and pulo Terutau. By passing westward of pulo Tenga, and between it and Pin islet, 7 feet above high water, all danger from the two rocks reported to exist between pulo Terutau and pulo Tenga, as well as any others that may exist in that unsurveyed portion, will be avoided. Thence course may be shaped for pulo Lada.

Small vessels, bound to Kedah and having local knowledge, pass between pulo Terutau and pulo Langkawi and the mainland, in depths of about 3 fathoms, but the coastline of the latter island is reported to extend considerably further north than charted ; the shore of the mainland is skirted by a shallow mud bank to distances varying from 5 to 8 miles; abreast pulo Langkawi, the passage is reduced to about 3 miles in breadth, and there are patches of 3 fathoms near the fairway. Southward of pulo Langkawi the shore may be approached to a depth of 5 fathoms.

Lat. 6° 30¼′ N. Long. 99° 39¼′ E.

PULO TERUTAU is high and mountainous, the ranges rising to about 2,000 feet, and one peak to 2,402 feet ; Pyramid point, the southern extremity, is a conspicuous hill 839 feet above high water. A black rock, awash at low water, is reported to lie 4 or 5 miles off the north-west side of the island. Another rock is said to exist in this channel; the recommended channel is westward of pulo Tenga.

Spire island, situated 2¼ miles eastward of Pyramid point, and close to the south coast of Terutau, has a remarkable spire-shaped peak, 625 feet above high water.

Sail rock, one mile southward of Spire island, is a square rock 108 feet above high water, resembling a sail. A rock, 30 feet above high water, lies 4 cables north-westward of Sail rock.

Plan, 1,143 [2,521]. Lat. 6° 35¾′ N. Long. 99° 41¼′ E. Var. 0° 50′ E.

Wanderer bay, on the east side of pulo Terutau, being nearly land-locked, is sheltered from all winds. In the centre of the bay is a conspicuous rock 175 feet above high water, with white patches on its eastern side; it forms a good mark when making for the anchorage, and can be seen between North and South islands between the bearings of S.W. by S. and W. ½ S.

Anchorage.—Good anchorage may be obtained, the best position being in the centre of the bay, from one cable to 2 cables north-westward

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of South island, as a bank of sand and mud, somewhat "steep-to," extends about 3 cables off pulo Terutau towards South island, leaving a channel between of about 1½ cables in width, with a depth of 5 fathoms. Plan 1,143 [2,521]. Var. 0° 50′ E.

Directions.—Steer for the anchorage with the conspicuous rock bearing W.S.W., and anchor in from 3½ to 4 fathoms water when the north extreme of South island bears S.E. ½ E., or from that position steer towards the island, near which there is a depth of 5 fathoms.

Supplies.—When visited by H.M.S. *Wanderer*, in March 1889, there was a small Malay village named Petok Wau, situated within the mouth of the creek abreast South island, also a few Chinese fishermen curing fish for export. There are a large number of wild pigs on the island, and some were shot in the clearing around the village. Fish may be obtained with the seine; the best place, most clear of rock, is the neighbourhood of Bold point, and here is a stream of good water.

Stakes.—Two stakes are placed about 4 cables northward of South island, and a stake surmounted by a flag on the south side of the entrance to the creek.

Tides.—It is high water, full and change, in Wanderer bay at noon; springs rise 12 feet, neaps rise over 6 feet (approximate).

Tidal streams.—The flood stream runs northward for 6 hours, and the ebb to the southward, at the rate of about one knot at neaps.

BUTANG GROUP, a group of islands lying about 20 miles west-north-westward of Langkawi island, is well wooded, and, until within a few miles, appears as one large island; the islands are "steep-to," having no anchorage except off the south sides. From the north-westward, Dome mountain, on pulo Adang, is seen over the eastern part of pulo Rawi, which is flat-topped, the peak of pulo Butang showing west of it. Chart 793 [2,515].

Water is plentiful on all the large islands.

Observatory islet, on the south-west side of the group, is 94 feet above high water and "steep to"; the observation spot is on the north side. Between Observatory islet and pulo Butang are seven small islands from 100 to 200 feet above high water, having no safe navigable channel between them. Lat. 6° 29′ 52″ N. Long. 99° 10′ 45″ E.

Pulo Butang shows with a sharp summit, 928 feet above high water, when seen from the north-east or opposite direction.

Anchorage may be obtained off the south-west side of the island in 11 fathoms water, over sand and shells, one third of a mile off shore.

Pulo Rawi, the eastern mountain of which is 1,594 feet above high water, and flat-topped, is separated from pulo Butang by a channel

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Chart,793 [2,515]. Var. 0° 50′ E.

a quarter of a mile wide. A small islet is situated close to the north-west point, to which it is joined by a reef dry at low water.

Water.—A cascade of excellent water will be found on the west coast, half a mile south of the north-west point, and is a convenient watering place.

Pulo Adang, the eastern of the two large islands, has a long sandy beach on the west side, fronted by a coral reef which extends one cable seaward. A small island, 98 feet above high water, lies 9 cables eastward from the north-west point of pulo Adang.

Lat. 6° 31¾′ N. Long. 99° 18½′ E.

Dome mountain, 2,315 feet above high water, on the southern part of pulo Adang, is conspicuous from all directions.

Pulo Nipis is separated from the south side of pulo Adang by a shallow channel three-quarters of a mile wide; it has two hills, the western, 385 feet above high water, being the higher.

A rock, 12 feet above high water, lies one mile east-north-east from pulo Nipis.

Pulo Besi, a narrow island one mile in length and 424 feet above high water, lies 1½ miles off the north-east point of pulo Adang. A rock, 60 feet above high water, lies 4½ cables south-eastward from the south point of pulo Besi, and another 1½ cables southward from the same point.

Pin islet and reef.—Pin reef is a narrow ledge of coral, "steep-to," one cable in length, and has a rock, 7 feet above high water, near its centre.

Lat. 6° 34½′ N. Long. 99° 27½′ E.

Pulo Tenga, or Half-way island, situated midway between pulo Adang and pulo Terutau, are two islands nearly joined by boulders at low water. The highest part, 680 feet above high water, is near the north end of the south island, and shows as a cone from the south-westward.

Tides.—It is high water, full and change, at the Butang group at 10h. 34m.; springs rise 9 feet.

Tidal streams.—The tidal streams are irregular and much influenced by winds and local causes.

PULO LANGKAWI, separated from pulo Terutau by a channel nearly 4 miles wide, is mountainous, formed and flanked by towering masses of limestone, and thickly wooded.

Lat. 6° 22¾′ N. Long. 99° 49′ E.

Gunong Raya, 2,952 feet above high water, the highest and most conspicuous mountain, is situated near the middle of the island; it is densely wooded, and viewed from the westward makes as three peaks.

Gunong Chinchang, or serrated mountains, rise abruptly from the western coast, the summit being precipitous and rocky. The highest peak

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of the ridge is 2,413 feet, and another conspicuous round-topped mountain, 2,348 feet above high water, rises immediately over Bongkot Pennyu (Dolphin nose). Chart, 793 [2,515]. Var. 0° 50′ E.

Villages.—Pulo Langkawi and the adjacent islands are subject to the Raja of Kedah. The valleys and plains are well cultivated with rice, sugar, &c., and hot springs have been found near tanjong Gamarau, the north-east extreme of the island. The natives are peaceable and friendly, and there are numerous villages, the principal one being Kwah, situated at the head of Bass harbour; it has a considerable population of both Malays and Chinese, principally fishermen.

The next in importance is situated about half a mile from the mouth of a small stream which empties at the north-east corner of Kwala Malacca, on the west coast of the island, and is said to contain 4,000 inhabitants, many of whom are Chinese; it was also, in 1884, the residence of the chief or Datu.

Supplies.—Fowls, eggs, and other small supplies can be obtained for silver dollars. Wild pigs are numerous, and the Argus pheasant is occasionally seen.

Trade is carried on with Penang and the adjacent coasts by junks; Siamese gunboats occasionally visit the island.

Kwala Malacca.—From tanjong Tukan Raja, the north-west point of pulo Langkawi, the coast trends for 5 miles in a southerly direction, to tanjong Bongkot Pennyu, or Dolphin nose; it is rocky, with a few sandy beaches, backed by precipitous mountains covered with jungle. Between tanjong Bongkot Pennyu and pulo Rebah is Kwala Malacca, protected from winds between S.S.E., through east, to North, and affording good anchorage for small craft; the north shore of the bay is rocky. Lat. 6° 27¼′ N. Long. 99° 38½′ E.

At one mile eastward from tanjong Bongkot Pennyu is a small islet, connected with the shore by a reef, and the bight eastward of the islet is known as Burau (old well); about 1½ miles inland, at the foot of a precipice, are several old wells from whence the name arises.

At the head of the bay is a long sandy beach, fronted by a bank of soft mud, rendering landing impracticable at low water except off the mouths of the two streams. The beach is backed by a fringe of jungle, behind which are several villages surrounded by cultivated land.

Pulo Rebah is a flat-topped island 551 feet above high water, having a conspicuous red landslip on its north-west side. A rock, which uncovers at low water, lies about half a cable from the north-west point, and a reef extends the same distance south of the south-west point, of the island.

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Chart,793 [2,515]. Lat. 6° 17½′ N. Long. 99° 41¾′ E. Var. 0° 50′ E.

A small islet, 235 feet above high water, lies off the east side of pulo Rebah, having a reef extending 2½ cables from its western point. A rock, 57 feet above high water, lies between this island and pulo Rebah.

From abreast of pulo Rebah, a sandy beach trends to the southward for 2½ miles to tanjong Sawah, in the centre of which is a conspicuous bluff fronted by a low spur of the hills behind. An island with two rocks off its north-west point lies near this coast.

BASS HARBOUR, between the south coast of pulo Langkawi and the north coast of Dayang Búnting, affords anchorage with complete protection. It is 7 miles in length, with an average breadth of 1½ miles, and a general depth of 3 to 4 fathoms, over mud bottom; its eastern entrance is known as Salat Kwah (Bass strait).

From tanjong Sawah the coast trends north-eastward for 6½ miles to a long sandy beach, being a succession of rocky points with sandy bays between them, and backed by hills rising to a height of 726 feet above high water. Along this coast are a few villages; the principal is Kwah, at the head of the harbour, as before stated.

The south-east coast of Bass harbour is bold; some of the cliffs are broken and irregular, rising abruptly from the water.

Within one mile eastward of tanjong Sawah are three small islands, and a rock about one foot above high water.

Shoals.—The following shoals lie in the western entrance to Bass harbour:—

A rocky shoal, about 1½ cables in extent, and drying in places at half ebb, northward of the fairway of the south-west entrance to Bass harbour, with the east extreme of pulo Singha Kintut bearing W.S.W. distant about 1½ miles.

A shoal, of small extent, with about 2 feet on it at low water, spring tides, lies with the preceding shoal, bearing S. by E. ½ E., distant about 4 cables, and the east extreme of pulo Singha Kintut S.W. ⅔ W.

Vessels should pass southward of these shoals.

Lat. 6° 14¾′ N. Long. 99° 43¼′ E.

Pulo Singha Kintut, one mile south-westward of tanjong Sawah, is 397 feet above high water, with a double hill.

Pulo Bras Basah has a sharp, well-defined summit 828 feet above high water; 1½ cables eastward of the south point of the island lies a rock which uncovers at half ebb.

Pulo Lada, the south-western island of the group, is hilly and covered with thick jungle. The highest peak, 1,006 feet above high water, situated near the southern end, is well defined.

The east coast of the island is indented, with fringing reefs extending about one cable off shore.

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Pulo Chupak, a small wooded islet, 100 feet above high water, lies 4 cables, S.E., from the south point of pulo Lada, having 11 fathoms in the channel between. Chart, 793[2,515]. Var. 0° 50′ E.

Pulo Dayang Búnting or Tubah is mountainous, with many rugged and peculiar limestone peaks, the highest of which is 1,571 feet above high water; off the western side of the island are several steep rocky islets, and its north extreme is tanjong Tirei. The coast line of these islands is formed of high perpendicular cliffs, which, in common with most of the islands off this coast, are undermined below high-water mark for some distance.

Tyson strait, between pulo Lada and pulo Dayang Búnting, is the south-western entrance to Bass harbour. In the middle of the strait is a mudbank, 1½ miles in length in a north and south direction, and one mile in breadth, under the depth of 3 fathoms, the least water being 13 feet.

Junk rock, 188 feet above high water, in the north part of Tyson strait, at its junction with Bass harbour, is square-shaped and precipitous.

Canister rock, a small square-shaped rock, 68 feet above high water, is the outermost of the group of islands in the south-east part of Tyson strait. Lat. 6° 10½′ N. Long. 99° 46½′ E.

Tides.—It is high water, full and change, in Tyson strait at noon; springs rise 8 feet.

Tidal streams.—The flood tide runs to the southward out of Bass harbour from one half to one knot, and the ebb stream the reverse way.

Current.—In the offing, the current generally sets to the northward during the south-west monsoon, and to the southward during the north-east monsoon.

COAST.—Paknam Satul (Kwala Satul) lies within tanjong Gabus, and northward of Perlis river. A depth of 12 feet was found on the bar at low water, which is well sheltered by the islands from the south-west monsoon. A vessel drawing 15 feet, if in charge of a pilot, might enter the river at high water and reach the town of Satul, about 10 miles above the entrance. Above the town the river is shallow. Lat. 6° 30′ N. Long. 100° 5′ E.

Perlis river entrance lies 13 miles eastward of tanjong Gamavan (pulo Langkawi), and coasting vessels anchor off it in 3 fathoms water, with a haycock-shaped mount bearing N.N.E., and south-westward of a group of four islands named Panjang, Kuning, Kurap, and Brasmana, which lie near the mainland on a mud flat; the mudbank fronting the coast here is very flat. There is said to be a depth of 12 feet at high water in the channel over the bar off the entrance.

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Chart,793 [2.515]. Var. 0° 50′ E.

Junks drawing 5 to 6 feet trade to Kangar the capital, 4 miles from the mouth of the river. Polit or Perlis is situated apparently about 10 miles up.

Lat. 6° 24¾′ N. Long. 100° 9½′ E.

Bukit Perlis, 670 feet above high water, 2 miles eastward of the entrance, should be a good mark for making the river.

Lat. 6° 6′ N. Long. 100° 17′ E.

KEDAH RIVER, the entrance to which is in about 20 miles southward of Perlis river, has a low water depth of about 3 feet in the channel over the bar, and from 11 to 12 feet at high water.

The navigation of the river to Saiburu presents no difficulty to vessels that can enter. In the third reach from seaward, where the river widens, the right bank should be kept. It is necessary to moor head and stern there.

LIGHTS.—Two leading lights are exhibited from the north point of entrance, and when in line lead over the bar in the best water.*

Town.—Saiburu or Alostar, the principal Siamese town in Kedah province and residence of the Sultan, is situated about 5 miles up the river, and has a population of about 6,000.

From the landing place near the Custom house, a good road extends about 6 miles in a northerly direction, on which are some very fair houses, a club, and the British Consulate. This road leads to Singora, 12 miles from Alostar, where the Governor of the southern province of Siam resides. At Anak Bukit, 4 miles from the town, is the country residence of the Sultan. The district is purely agricultural.

Communication.—The town is connected with the police station on the north side of the entrance by telephone, and there is telegraphic communication with Penang and Singora. A railway is projected to the Prye river.

Outer anchorage.—There is anchorage, in about 4 fathoms water, at 3 miles off Kedah river, with the entrance bearing E. by N. and pulo Búnting about S.S.E. $\frac{1}{8}$ E.

Tides.—It is high water, full and change, at noon; springs rise 9 feet.

KEDAH PROVINCE, situated between Siam and Pérak, and under the protection of Siam, is about 140 miles in length and about 50 miles in breadth. It is distinguished from the other states of the Malay peninsula by the greater amount of its level ground, which affords considerable facilities for the production of wet grain; the highest hill is Gunong Jerai or Kedah peak, a mass of granite 4,019 feet above high water.

Lat. 5° 47′ N. Long. 100° 26¼′ E.

North of Gunong Jerai is an immense plain of gentle elevation, bounded on the east by a small chain of hills 16 to 20 miles inland, but near the coast it is covered with a belt of mangroves from a half to a mile in

General chart, 842 [2,492].

* Another light is reported, but its character is not known.

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breadth; the Kedah, before described, is its most considerable river. The population of the province is about 34,000, the bulk of whom are padi planters and fishermen. Chart.793 [2,515]. Var. 0° 50′ E.

Bukit Geraing (Elephant mountain), 780 feet above high water, is an isolated mass of limestone, honeycombed with magnificent caves, situated 5 miles north-eastward of Kedah river entrance, and is a good mark for making that river. It has the appearance of an elephant kneeling, with its head to the southward, particularly when bearing about N.E. by N. There is a smaller hill to the northward of Bukit Geraing. Lat. 6° 11½′ N. Long. 100° 20′ E.

Off-lying islets.—Pulo Sagantang, a high rock, lies about 22 miles westward of Kedah river and 10 miles south-east from the south extreme of pulo Dayang Búnting. There are depths of 16 fathoms close to its north and east sides, and 19 fathoms 2 miles south-west of it. Lat. 6° 2½′ N. Long. 99° 55¼′ E.

Pulo Paya, lying 6½ miles eastward from pulo Sagantang, is high, about one mile in length, 3 cables in breadth, and "steep-to" with the exception of part of the north-east side. At one mile south-west of the island there is a 5-fathoms patch, named Barat Dayah, and at one mile from the north-west side is Tokun Barat, another patch with the same depth over it.

Pulo Lembu, separated from the north-east end of pulo Paya, by a channel half a mile wide, is about a quarter of a mile in extent, high, and foul on its north side to the distance of 2 cables. In the channel, and about a quarter of a mile from the west end of pulo Lembu, is pulo Kacha, a small rock about 3 feet above high water.

Near the islands of Paya and Lembu there are, with the exceptions mentioned, depths of 13 to 16 fathoms within half a mile of the islands, and depths of 9 to 11 fathoms will be found until within 5 miles of the entrance of Kedah river.

PULO PERAK, or Silver island, a peaked, barren, white rock, 394 feet above high water, entirely devoid of trees, and the resort of numerous sea-birds, lies nearly midway between Jambu Ayer or Diamond point and Kedah river; it is "steep-to," there being from 40 to 50 fathoms water near it. Lat. 5° 42′ N. Long. 98° 54′ E.

Pulo Perak is often taken as a point of departure, and when the weather is cloudy during the south-west monsoon it is not unfrequently the first land seen after entering Malacca strait from the northward. Sailing vessels should then give it a wide berth, for at that time calms and light airs are likely to prevail in its neighbourhood, during which vessels have been carried by the current towards it, and have been obliged to anchor in deep water to prevent being driven against the steep rock.

General chart, 1,355 [2,513].

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Chart, 793[2,515]. Var. 0° 50′ E.

COAST.—From Kedah river the coast extends in a southerly direction for a distance of 25 miles to the entrance of Merbau river, and continues low and wooded until within 8 or 9 miles of that river, where Gunong Jerai or Kedah peak, 4,019 feet above high water, is situated at a distance of 4 miles from the coast. Bukit Choreh or False Elephant mountain is 10 miles northward of Gunong Jerai and 7 miles inland; the head of the animal it somewhat resembles is situated to the westward and the hump to the eastward. Southward of Merbau river, as far as the north entrance to Penang, the coast continues low.

Lat. 5° 56½′ N. Long. 100° 28′ E.

Dangers.—At 5½ miles southward of Kedah river and 2¼ miles off shore, there is a rock with a less depth than 6 feet over it and 4 fathoms close-to; 6 miles southward of this is Tokun Bavalla Banku, a rock awash at low water, lying 2½ miles northward of pulo Búnting, and 1½ miles from the shore.

A mud-flat, with depths of less than 3 fathoms, skirts the shore between Kedah and Merbau rivers, to the distance of about 2 miles, until abreast of pulo Bidan and Merbau river, where the edge of the bank is 4½ miles off; thence it gradually approaches the shore until abreast the north end of pulo Penang, where it is one mile distant.

BUNTING ISLANDS consist of pulo Búnting, pulo Songsong, pulo Telor, and pulo Bidan; the whole of which are barren. Depths of from 10 to 12 fathoms will be found 3 miles seaward of them. Pulo Búnting is 610 feet above high water, 1¼ miles in length, half a mile in width, and separated from the mainland by a channel one mile wide, having from 6 to 9 feet water. It is situated about midway between Kedah and Merbau rivers.

Lat. 5° 48¾′ N. Long. 100° 17¾′ E.

Pulo Songsong, lying 4 miles south-south-westward from pulo Búnting and 4¼ miles from the mainland, is almost circular, and about a quarter of a mile in diameter. It is skirted by a reef to the distance of one cable. At one mile south-westward from pulo Songsong are Songsong rocks, 25 feet above high water, and occupying a space of a quarter of a mile; there are depths of from 8 to 10 fathoms a short distance from the rocks.

Pulo Telor lies 2¼ miles southward from pulo Songsong, and is skirted by a reef. Depths of 7 fathoms are found between the two islands, and the water shoals gradually towards the shore.

Pulo Bidan lies one mile south of pulo Telor, and is two thirds of a mile in length by a quarter of a mile in breadth; the island is almost encircled by a reef.

Merbau river, the entrance to which is formed between the low coast on the north and Merbau hills on the south, is fronted by the coast mud-flat which has depths of from 4 to 6 feet over it, and extends nearly 3 miles to seaward. Old Kedah is situated on the north side of the entrance, and off the south side is pulo Sayer, 274 feet above high water.

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Muda river, situated about 6 miles southward of Merbau river, had a depth of about 10 feet on the bar at high water. A village stands on either point of the entrance, and a larger one at about 7 miles up the river, on the right bank. Chart, 793 [2,515]. Lat. 5° 34′ N. Long. 100° 20¾′ E. Var. 0° 50′ E.

Boundary.—Muda river is the boundary between Kedah and Province Wellesley.

CAUTION.—Fishing stakes.—In passing between Kedah river and Penang during the night, care must be taken to keep clear of the numerous fishing stakes which are fixed in places some 6 or 7 miles from the land.

PULO PENANG,* or Prince of Wales island, is a British settlement nearly 14 miles in length in a north and south direction, from 6 to 9 miles in breadth, and has an area of about 107 square miles; it is separated from the mainland by a strait from 1½ to 7 miles in breadth, which affords sheltered anchorage for all classes of vessels. Chart, 1,366 [2,516]. Lat. 5° 14¼′ N. to 5° 28½′ N. Long. 100° 10¼′ E. to 100° 21′ E.

Province Wellesley, on the shore of the mainland, forms part of the settlement, also the Dinding islands, and a small portion of the mainland abreast them.

Owing to the vicinity of Penang to the Bay of Bengal, the influence of the monsoons is more distinctly felt there than in any other of the Straits Settlements.

Depths in entrances.—The northern entrance to Penang is at all times preferable for large vessels, there being charted depths of about 4 fathoms at low water in the channel, with a spring rise of 9 feet, but reports having been received that various vessels, drawing about 25 feet, have taken the ground at, or near, high water, it would appear that this channel is silting, and therefore great caution is necessary in proceeding through it until a re-survey has been made.

The southern entrance channel has a depth of 3¼ fathoms at low water, spring tides.

Aspect.—The north part of pulo Penang is mountainous, and through the centre of the island runs a range of hills, declining in height as it approaches the south-west extremity; but two-thirds of the whole surface of Penang is level and of gentle inclination, and, like the hills, is well-wooded. West hill, the highest point of the island, is 2,735 feet above high water; at a short distance to the eastward is Government hill, on which stands a signal flagstaff 2,551 feet above high water. The western side of the island is low and wooded. Lat. 5° 25′ N. Long. 100° 15′ E.

Islands.—Pulo Kendi or Saddle island, nearly 2 miles southward of tanjong Gertah Sangul, the south-west point of Penang, is high, about half a mile in length, and a quarter of a mile in breadth.

General chart, 1,355 [2,513].

* Properly Pinang (the Betel-nut palm), and so called by the natives, but the word Penang is fixed by usage.

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Chart, 1,366 [2,516]. Var. 0° 50′ E.

Pulo Rimau, separated from the south-east point of Penang by a passage 4 cables in width, is "steep-to" on its south-east side, on which there is a lighthouse. From tanjong Gertah Sangul a shoal bank extends in a semi-circular form to Rimau island.

Jerejak island, 741 feet above high water, lying 5 miles southward from Georgetown, is a bold island, 2¼ miles in length, in a north-north-east and south-south-west direction, and from a quarter to three-quarters of a mile in breadth, rising in a pyramidical form; with Middle bank it forms the western side of south channel.

Lat. 5° 27¾′ N. Long. 100° 18′ E.

Pulo Tikus (Rat island), a small islet surrounded by rocks, with an obelisk as a harbour mark, lies on the mud bank fronting the island at half a mile off-shore, and nearly 4½ miles north-westward of fort Cornwallis lighthouse.

GEORGETOWN, the capital, is situated at the north-east extremity of pulo Penang, with a population in 1901 of 128,830, of whom the majority are Chinese, while the Malays chiefly occupy the country districts.

It is built on level ground, and is clean and well supplied with water by iron pipes from two mountain streams. It has a handsome church, two Roman Catholic chapels, a court-house, the government offices, gaol, public school, poorhouse, and the civil and military hospitals.

Butterworth is situated on the mainland, abreast fort Cornwallis.

Fort Cornwallis is situated on the north-east point of the island, and there are cantonments for troops near the town.

Lat. 5° 27¼′ N. Long. 100° 11′ E.

LIGHTS.—On the summit of tanjong Puchat Muka, the north-west point of the island, a lighthouse of grey granite, 45 feet in height, exhibits, at an elevation of 795 feet above high water, a *white flashing* light with a period of system of *twenty seconds*, which should be visible, in clear weather, from a distance of 30 miles.

Lat. 5° 24½′ N. Long. 100° 20¾′ E.

On the north-east bastion of fort Cornwallis a *white revolving* light, with a period of revolution of *half a minute*, is exhibited, at an elevation of 107 feet above high water, from a flagstaff painted white, and should be visible, in clear weather, from a distance of 15 miles.

Lat. 5° 14′ N Long. 100° 16½′ E.

An iron tower, 57 feet in height, erected on a masonry base and situated on the eastern side of Rimau island, N. by E., distant 1¾ cables from its southern point, exhibits, at an elevation of 129 feet above high water, a *red occulting* light, with a period of system of *twenty seconds*, showing light *seventeen and a half seconds*, followed by an eclipse of *two and a half seconds;* it should be visible, in clear weather, from a distance of 13 miles.

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Two *red fixed* lights, *placed horizontally*, are shown from the northern and two *green fixed* lights, *placed vertically*, from the southern mole head. Chart 1,366 [2,516]. Var. 0° 50′ E.

Telephone cable lights.—*See* page 170.

Lloyds signal station.—Lloyds signal station is situated on Government hill, westward of the town, and 2,551 feet above high water. Lat. 5° 24¾′ N. Long. 100° 17′ E.

Pier.—The New Iron pier, which has a long T head, is situated about 2 cables south-westward of fort Cornwallis lighthouse; it is 700 feet in length and vessels can go alongside, there being a depth of 29 feet at low water, spring tides. There have been recent dredging operations.

Communication.—Most of the larger companies' steamers call at Penang; the Netherlands Royal Packet Company's steamers between Singapore and Padang call every fortnight; there is fortnightly communication by the same steamers with Batavia, also constant communication with the other parts of the Straits Settlements and with Sumatra. Specially built steamers run from Penang in connection with the railway at Prye, which connects with the Perak system. Telegraphic communication with all parts and a telephone service; the telegraph office is always open. (*See* Chapter I., page 7.)

Submarine telegraph cables.—Two cables connect Penang with Singapore; single cables are laid to Malacca and Deli, and there are two cables to Madras, one being *viâ* pulo Weh. A telephone cable crosses the harbour about half a mile northward of fort Cornwallis. Lights, beacons, buoys, *see* pages 169, 170.

Coal and supplies.—About 4,000 to 7,000 tons of coal are usually kept in stock, and put on board by lighters holding from 30 to 75 tons; about 500 tons can be put on board in 24 hours; coaling is carried on by bags. There is a coal wharf 300 feet in length, with a least depth of 16 feet alongside, and a Government new iron wharf.

About 3,000 tons of liquid fuel are kept in stock, and the Company have a wharf, 250 feet in length, with a depth of 26 feet alongside.

Fresh meat, vegetables, fruits, bread and other supplies may be obtained in large quantities; water is conveyed to the shipping in tanks, and the island produces fine timber, which is well adapted for spars and ship-building.

Dock.—At the entrance to Prye river, on the mainland, page 173, is a dry dock 343 feet in length over all, and 332 feet on the blocks with 46 feet breadth of entrance and a depth of 14½ feet on the sill and blocks at high water, ordinary spring tides; a vessel of 2,304 tons, 284 long and with a draught of 12⅔ feet, has been docked.

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Chart, 1,366 [2,516]. Var. 0° 50′ E.

Patent slip.—A patent slip is 80 feet in length on the cradle, has a depth of 7 feet aft and 3½ feet forward on the blocks, and is suitable for vessels 190 feet in length and not exceeding 200 tons burden.

Repairs.—Large repairs to engines and boilers are undertaken at Penang and Prye river; there are sheers which will lift 25 tons, small steam hammers and a large number of lathes. A vessel of 200 tons has been built, and the Dutch gun vessels effect repairs at the latter works.

Sick quarters.—There is a good general hospital 3 miles from the town, and a quarantine station and leper hospital on pulo Jerejak.

On the top of Penang hill, at an elevation of 2,500 feet above high water, is a convalescent bungalow, distant 8 miles from the town.

Lat. 5° 24′ 30″ N. Long. 100° 20′ 44″ E.

Observation spot.—The position of the fort signal staff depends upon the new Observation spot at Singapore, being in long. 103° 51′ 16″ E.

Trade.—Penang is a free port. The exports comprise, tin, sugar, spices, sago, rice, buffalo hides and horns, rattans, gum, coffee and opium. In 1904 the value of the trade amounted to $184,460,483. About 21,000 tons of coal and 6,000 tons of liquid fuel are imported annually.

5,529 steam and sailing vessels entered and cleared from the port of the aggregate tonnage of 2,618,842 tons.

Banks in the approaches.—Pulo Penang stands on a bank, with depths of less than 3 fathoms over it, extending from one mile to 2 miles northward and from 3 to 3½ miles westward and southward. A series of shallow banks skirt the eastern side of the island.

Great Kra flat extends along shore from abreast the Prye river to pulo Talang, a distance of 60 miles, and has a breadth of 10 to 12 miles. This flat, dry in places at low water, nearly fills the channel between the south part of pulo Penang and the main land, and abreast Rimau island the flat is nearly 5 miles in breadth, from thence it tapers to a point abreast Prye river.

The south channel to Penang lies on the west side of the point of this flat, and a channel of 6 to 8 fathoms leading to the Prye, Juru and Batukawan rivers, lies eastward of it. Southward of these rivers and of the Kra islands, Kra flat joins the shore banks, and there is no channel for vessels in that direction.

Batumau flat, between the south end of Jerejak island and Batumau point, is dry in patches at low water; a rock, 2 feet above high water, lies one cable northward of Batumau point, and between the two northern prongs of Batumau flat is a rock which dries 8 feet.

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Middle bank, on the east side of pulo Penang, stretches northward from Jerejak island for a distance of nearly 5 miles, and is dry at low water to within half a mile of its north extreme, where it is separated from the bank which fringes the eastern side of Penang by a narrow channel with a depth of $3\frac{1}{4}$ fathoms; between Middle bank and pulo Penang the depths are from $3\frac{1}{2}$ to 5 fathoms. Chart, 1,356 [2,516]. Var. 0° 50′ E.

On the eastern edge of Middle bank is Syrang bank, a narrow ridge one mile in length, the southern half of which dries. (Buoys, *see* page 171.) Lat. 5° 21′ N. Long. 100° 20¼′ E.

NORTH CHANNEL is formed between the mud-flats which skirt the shore of the mainland and of Penang, and has 4 fathoms water in its shallow part, the channel of deep water lying about midway.* The shores of the mainland, being low and covered with trees, are not so conspicuous as the high land of the island; consequently the latter will generally appear nearer when the vessel is in mid-channel between them. From abreast of pulo Tikus the water in the fairway deepens gradually from about 7 fathoms, to 11 and 13 fathoms in the harbour of Georgetown.

LIGHT BUOY.—A buoy, painted red, and exhibiting a *white occulting* light, is moored in the North channel, with pulo Tikus bearing S.S.E. distant $3\frac{3}{10}$ miles and the extreme of tanjong Puchat Muka S.W. by W. $\frac{3}{4}$ W.

Telegraph buoy.—A conical buoy, painted red, and surmounted by a staff and cage, marking the telegraph cables, lies in 4 fathoms water, with the fort light bearing S. by E. $\frac{5}{8}$ E. distant 7 cables.

Buoys.—A small buoy, painted black and white, is moored about $1\frac{1}{2}$ cables north-eastward, and a similar buoy, painted white, about one cable south-south-eastward of the new pier. (*See* Prohibited anchorages, page 170.) On Thursday nights, every alternate week, whenever vessels are going alongside or leaving the Government pier, the above black and white buoy will show a *red* light.

Tugs.—There are about six tugs.

Pilots.—The employment of pilots is optional. Pilots for the north channel take vessels to the northward of pulo Tikus; those for the south channel are now at Rimau island and take vessels between there and No. 1 buoy, both on entering and departing. Pilots for Lárut river may be obtained at Penang.

The pilot boats are large, painted white, and have "Pilot" lettered in black on the sail; they fly a white and red flag with letter P. in blue in the centre, and at night show a blue light.

LIGHTS.—Beacons.—The direction of the telephone cables is marked by two beacons.

General chart, 1,355 [2,513].

* *See* Depths in entrances, page 165.

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Chart, 1,366 [2,516].
Var. 0° 50′ E.

The eastern, or high beacon, painted white, is placed against, and to show over, the Harbour limit mark, northward of Prye river.

Lat. 5° 25′ N.
Long. 100° 22½′ E.

The western, an iron pile beacon, painted white, stands in a depth of 5 feet at a distance of about 3 cables, West, from the high beacon.

Each beacon exhibits a *white fixed* light which, in clear weather, should be visible from a distance of 5 miles, and the beacons, or lights, in line bearing East, indicate the direction of the telephone cables and also the prohibited anchorage ground.

Anchorage.—The anchorage off Georgetown is situated in the narrowest part of the strait, which is here 1½ miles in breadth; it is well sheltered and capable of accommodating a large number of vessels. There is deep water close to Fort point, and the water shoals gradually towards the mainland from half a mile eastward of the fort. A space is reserved for vessels of war extending about 4½ cables northward of fort Cornwallis, in which there is anchorage in from 6 to 10 fathoms water; it is recommended in preference to the crowded anchorage southward of the fort.

The best berth for a large vessel is about 3 cables south-eastward of the Fort point in from 11 to 13 fathoms water, and for small vessels closer to the town, subject to the harbour regulations; it is necessary to moor as the tidal streams run strongly.

Prohibited anchorages.—Anchorage is prohibited in the under-mentioned areas:—

(*a.*) In the area comprised within a line drawn in a direction S.E. by E. ⅜ E. from the harbour mark on pulo Tikus, until it is intersected by another line drawn N. ½ E. from fort Cornwallis flagstaff. The prohibited arc is between these lines and the north-eastern coast of pulo Penang.

(*b.*) Within 1½ cables northward or southward of the line of the telephone cable laid between the harbour mark, erected about 2 miles E. by N. ⅜ N. from fort Cornwallis flagstaff, and the red telegraph buoy, moored 7 cables, N. by W. ⅝ W. from the same flagstaff.

(*c.*) Vessels are not permitted to anchor westward of a line joining the black and white buoy and the white buoy, moored north-eastward and south-westward respectively of the New Iron pier, and they must anchor at a sufficient distance eastward so that they will swing clear outside it.

Anchorage in the fairways is also prohibited.

The quarantine anchorages are abreast of Jerejak island and that known as the Gunpowder anchorage.

Directions.—The fishing stakes which are situated from 3 to 4 miles north-westward from pulo Tikus, and nearly 3 miles from the nearest

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shore, are a guide to the deep-water channel; these extend into 4 fathoms water, but a good berth should be given to them, as there are many old stakes broken off 2 or 3 feet under water. Pass about a mile to the north-eastward of the light buoy, steering about S.E. until the outer buildings on the point northward of Prye river bear S.S.E., when they should be steered for until abreast the telegraph buoy, when course may be altered as requisite for the anchorage. *See* Depths in entrances, page 165. Chart, 1,366 [2,516]. Var. 0° 50′ E.

Sailing vessels may work in by the lead.

By night.—Tanjong Puchat Muka light kept southward of S.W., leads northward of the fishing stakes, and fort Cornwallis light kept southward of S.S.E. leads eastward of them, and, with the light buoy, these lights afford a sufficient guide to the anchorage.

SOUTH CHANNEL.—The South channel to Georgetown is between pulo Jerejak, Syrang bank and Middle bank on the west side, and Great Kra flat on the east side. The deep-water channel varies in width from half a cable to one mile, and has $3\frac{1}{4}$ fathoms least water.

Beacons and buoys.—The South channel is marked by buoys and beacons numbered 1 to 10 from the anchorage, as follows:—

Western side of the channel from the anchorage—

No. 1 buoy, conical, painted red, about $1\frac{1}{2}$ cables eastward of the northern drying portion of the Middle bank.

No. 3 buoy, conical, painted white, about 3 cables south-eastward of the south extreme of Syrang bank.

No. 5 beacon, exhibiting a *red fixed* light, and situated about N.E. by E. $\frac{1}{2}$ E. distant $1\frac{4}{10}$ miles from the north point of Jerejak island. Lat. 5° 20¼′ N. Long. 100° 20¼′ E.

No. 9 buoy, conical, painted red, and lying about two miles south-westward of Rimau island.

Eastern side of the channel from the anchorage—

No. 2 buoy, conical, painted white and marking the western side of the detached bank in the channel.

No. 4 beacon, exhibiting a *green fixed* light, and placed near the northern end of Great Kra flat.

No. 6 buoy, conical, painted white, about 7 cables southward of No. 4 beacon.

No. 7 buoy, conical, painted white, marking the western edge, of Great Kra flat, abreast the north end of Jerejak island.

No. 8 buoy, conical, painted white, marking the western edges of the Great Kra flat, abreast Batumau point.

No. 10 buoy, conical, painted white, on the western edge of the Great Kra flat, at the southern entrance to the channel.

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Chart, 1,366 [2,516]. Var. 0° 50′ E.

Fishing nets, which often extend across the fairway, are marked by three stakes moored vertically, one over each end of the net and one over the centre, showing about 2 feet above water, and appearing like ordinary fishing stakes; they may be avoided by passing between the sets of three stakes. Vessels should also avoid the fishing stakes, which frequently extend a considerable distance into the fairway.

Directions.—From the southward a vessel should not bring pulo Kendi to bear westward of N. $\frac{7}{8}$ W. until Rimau island lighthouse bears N.E. $\frac{1}{2}$ N.; course may then be altered for Rimau island, passing between Nos. 9 and 10 buoys, and within about 2 cables of that island; thence the vessel will be guided, by the buoys, to the anchorage off Georgetown.

Sailing vessels should not enter the South channel without a commanding breeze from the south or south-west, which breeze does not often blow except in August and September.

At night it is optional with the pilots whether they will take vessels in or out.

Tides.—It is high water, full and change, at Georgetown at noon; springs rise 9 feet, neaps 7 feet. At Rimau island it is high water about three-quarters of an hour later. At the change of the monsoon in May, the tides at full moon have less range than at new moon; the lowest day tides occur in February and March.

Tidal streams.—At springs the tidal streams run at the rate of 3 knots an hour. During the north-east monsoon the tidal streams are regular, the flood or southerly stream running from about 2 hours after low water to about two hours after high water by the shore; the ebb the reverse.

In November the current formed by the south-west monsoon sets round tanjong Puchat Muka and overcomes the ebb stream, sometimes for 2 or 3 days.

In the offing between Penang and Parcelar hill the tidal streams during springs are regular, the flood setting to the south-east, the ebb north-west, at the rate of 2½ or 3 knots an hour; the turn of the stream is probably the same as mentioned above. During neaps there is no perceptible stream.

Lat. 5° 22¼′ N. Long. 100° 22¼′ E.

COAST.—Prye or Prai river.—The rivers Prye, Júru, Batukawan and Tenga have their exit on the coast abreast Penang.

Prye river is situated on the mainland, 2½ miles south-westward of Georgetown, and eastward of the northern end of Great Kra flat. A mud flat which dries, extends about 3 cables southward of the northern point of entrance, and about 2 cables off the east point, and the south point is

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embanked, and here are situated the workshops, &c., in connection with the dock. (*See* page 167.) The channel over the bar has a depth of about 9 feet, and the river abreast the dock from $2\frac{1}{4}$ to $3\frac{1}{2}$ fathoms at low water. Chart, 1,366 [2,516]. Var. 0° 50′ E.

Communication.—The railway from Prye river runs to Taipeng and thence, through Perak and Selángor, to Seremban *See* Chapter I., page 14.

Beacons.—The entrance between the banks is marked by two beacons, painted red on the port hand, and a beacon, painted white on the starboard hand.

Harbour mark.—A harbour mark obelisk is situated near the south point of the river.

Batukawan (Junjon) river entrance has a depth of only one foot at low water over the bar, but within the depths are from one fathom to 4 and 5 fathoms. It joins the Tenga river on the east side of Batukawan island. The Admiralty chart will give the best idea of these streams.

Beacons and buoy.—The north side of the bar is marked by a beacon, painted white, and surmounted by a cage; a beacon, painted red, and a conical buoy, painted white.

Kra islands lie about one mile off the entrance of Batukawan river. North Kra island is one mile in length and 337 feet above high water, and South Kra three-quarters of a mile in length and 269 feet above high water, is separated from North Kra by a passage having 3 feet water. There is a channel, with not less than 4 fathoms water, leading from Georgetown to Kra islands, and the coast abreast, eastward of Kra flat, but southward of the islands Great Kra flat blocks the passage. Lat. 5° 16′ N. Long. 100° 23½′ E.

Krian river, 3 miles southward of Tenga river, is navigable, for craft drawing $4\frac{1}{2}$ feet water, for a distance of 40 miles. It is an important outlet both to the province of Wellesley and to Perak. Chart,793 [2,515].

PERAK. — Boundary. — The boundary between Province Wellesley and the State of Perak is situated about 2 miles southward of Krian river, thence in a direct line to Parit Buntar on that river. It is stated that several portions of the coast line of the State of Perak, also parts of that of Province Wellesley, show indications of alteration; the sea sometimes encroaching on the land and *vice versâ*. Lat. 5° 7½′ N. Long. 100° 24′ 40″ E.

Coast.—The coast from Krian river takes a south-south-west direction for $5\frac{1}{2}$ miles to tanjong Piandang, thence south-eastward for $13\frac{1}{2}$ miles to tanjong Pasir, in Selensing bay, beyond which at a further distance of

General chart, 1,355 [2,513].

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Chart,703 [2,515]. Var. 0° 45′ E.

6 miles is Lárut river. This coast forms several bights, is low and thickly wooded, and fronted by flats, with depths of less than 3 fathoms in places, to the distance of 10 miles.

Fishing stakes.—On the flats, between Penang and Lárut river, there are numerous fishing stakes situated several miles off shore, but generally within a depth of 3 fathoms.

The rivers Kurau and Kota enter the sea between tanjong Piandang and tanjong Pasir; the former is a considerable stream, but its bar is extending; its north bank advancing seaward, and the entrance becoming narrower and more shallow.

SELENSING BAY.—Sungi Sengar Besar.—Selensing bay forms the approach to Sungi Sengar Besar on which is Port Weld. Selensing river lies to the northward of Sungi Sengar Besar, and also leads to Port Weld, but by a very circuitous route.

The bay is blocked by the shore flats, the continuation southward of the Kra flats; it forms a bar 2 miles wide with a low water depth of about 4 feet, over a bottom of mud, sand and shells, comparatively hard, in the approach to both these rivers.

Lat. 4° 53′ N. Long. 100° 31½′ E.

Tanjong Pasir, the northern point of the bay, may be recognised by the sandy beaches on the north and south side of it, the only sand in the neighbourhood; there is also a fishing village on the point. The coast southward to tanjong Krang is mangrove jungle, covered for some distance inland at high water, spring tides.

Beacons.—Two beacons mark the south side of the entrance channel to the river.

Directions.—Approaching Port Weld by Sungi Sengar Besar, cross the bar which has 4 feet at low water, and 12 feet at high water, spring tides, by passing just northward of the two bar beacons; no difficulty will be found in navigating to Sapetang island, situated half a mile below Port Weld, the depths to which are not less than 12 feet at low water.

Sapetang island is nearly connected at low water to the shore westward of it; the channel therefore is northward of that island, when Port Weld will be seen south-eastward of it; from this to Port Weld the depth over the bank that bars the river is from 2 to 4 feet at low water, but it is intended to dredge a channel through this bank. The depths in the river off the wharf are from 3 to 4 fathoms.

Tides.—It is high water, full and change, in Selensing bay at 1h. 58m., and at Port Weld at 2h. 26m.; springs rise 8 feet, neaps 6 feet.

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Tidal streams.—At 2 miles off tanjong Krang the flood runs S.E., and the ebb N.W. at the rate of 1½ miles an hour; probably turning as at Penang. (*See* page 172.) Chart,793 [2,515]. Var. 0° 45′ E.

PORT WELD or SAPETANG is distant 5 miles from the entrance to Sungi Sengar besar, at the junction of that river with Sapetang channel leading from Lárut river; a somewhat longer route from the sea, described on page 176. The bar has 4 feet at low water, and 12 feet at high water, spring tides, and there is about the same depth in the channel at port Weld. Lat. 4° 50½′ N. Long. 100° 38′ E.

Port Weld is the port of Taipeng the capital, distant about 8 miles, to which it is connected by rail and a good road. The wharf at Port Weld has a depth of about 10 feet alongside at low water; there is also a road to Kwala Kangsa, distant 22 miles, the seat of the Resident of Perak.

Communication.—There is a daily service of steamers between port Weld and Penang in connection with the railway which joins the Perak railway system; telegraphic communication.

Trade.—The principal export is tin; the imports are rice and other necessaries for the miners, who are principally Chinese.

Tides.—It is high water, full and change, at port Weld at 2h. 26m.; springs rise 8 feet, neaps 6 feet.

LARUT RIVER, the entrance to which lies about 4 miles southward of Sungi Sengar besar, is nearly 2 miles wide between tanjong Krang and tanjong Burong, but much encumbered with mud flats which dry at low water. A bar nearly 2 miles in length, with a depth of 4 feet at low water, spring tides, fronts the entrance, inside which the water deepens.

LIGHTS.—A *red fixed* light is exhibited at an elevation of 30 feet above high water, from a mast, painted white, on tanjong Krang, north side of Lárut river; it should be visible, in clear weather, between the bearings of N. 10° E. and S. 80° E. from a distance of about 4 miles. Lat. 4° 48½′ N. Long. 100° 33½′ E.

A *red fixed* light is exhibited from a beacon marking the south side of the fairway to the river, situated with tanjong Krang bearing N. by W. ¾ W., distant 1⅛ miles; also a *red fixed* light is exhibited from another beacon on the south side of the channel, at the junction of the Lárut and Sapetang rivers. Lat. 4° 47¾′ N. Long. 100° 38′ E.

Beacons.—Two beacons mark the bar fairway, about one mile apart, and beacons, with discs, mark the edges of the banks on both sides of Lárut river as far up as Trusan Siamang, just below the police station. The discs on these beacons are painted black on one side and white on the other, those on the south side of channel being black to seaward and

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Chart,793 [2,515]. Var. 0° 45′ E.

white in shore; the northern beacons are the reverse. The black side of the discs must be always kept on the starboard hand, and white side of discs on the port hand, both on entering and leaving the river.

Lat. 4° 49½′ N. Long. 100° 39¾′ E.

Telok Kertang, about 7 miles from the entrance of Lárut river, is the port of Lárut and has a wharf and custom house; the shallowest spot in the river is abreast Trusan Siamang, just below the police station, where the depth is only 4 feet, but abreast the town it is 120 yards wide, with a depth of about 12 feet. A road connects Telok Kertang with Taipeng, Matang, and Kwala Kangsa.

Kwala Sapetang, 4 miles within tanjong Krang, leads to port Weld; its entrance has a short bar with 6 feet at low water, spring tides.

Sungi Limau is separated from Lárut river by an extensive mud bank which dries in patches; the water deepens inside the bar to about 2 fathoms, the channel being marked by fishing stakes.

Directions.—Vessels should approach Lárut river with the light-house bearing East, until the outer beacons are seen, then they should be steered for, passing from one cable to 2 cables on either side in a depth of 12 feet at high water, spring tides; pass northward of No. 3 beacon (showing the black side of a disc, and *red* light at night), the other beacons will then be seen, which mark both sides of the channel.

If bound to Telok Kertang, when abreast the beacon with *red* light at night, off the entrance to Kwala Sapetang, steer across to the south shore, between the beacons, to avoid the bank extending nearly across the channel from the north shore, crossing the bar off Trusan Siamang, with 12 feet at high water, spring tides, and keeping the south shore until abreast of the police station. Thence the river is narrow and tortuous, but deeper; the concave side should be kept as far as the last point before reaching Telok Kertang, when haul over for it as soon as the town opens, to avoid a spit off the creek on the north shore.

Proceeding to Port Weld haul into Kwala Sapetang when that channel is well open, the entrance to which has 14 feet on the bar at high water, spring tides, thence deepening to Port Weld; when within the bar keep the concave side of the channel.

Pilots for Lárut river should be obtained at Penang.

TAIPENG, situated at the foot of the Gunong Tupei range, and 8 miles from Port Weld, is the seat of government of the State of Perak, and also its largest and principal town; the houses are built of brick, laid out in squares, with streets 70 feet wide. The principal buildings are the court-house, police barracks (the latter accommodating over 800 police who are Sikhs), a reading room, and an hotel under European management. Water is led from the mountains and through the town by pipes.

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The assistant Resident is stationed here, and his house stands on a hill overlooking the town and mines. Chart, 793 [2,515]. Var. 0° 45′ E.

Communication.—A railway connects Taipeng with Port Weld and with Ulu Sapeting, and there is telegraphic communication with all parts. (*See* Chapter I., page 14.)

Trade.—The chief product is tin from the mines in the district, principally worked by the Chinese. Gold is found in some parts, but not in sufficient quantity to pay for working.

The exports consist of tin, attaps, firewood, sugar, rattans, timber, fruit, and salt fish; the imports are specie, rice, opium, live stock, oil, piece goods, and provisions.

Mountains.—Eastward and south-eastward of Taipeng and about 15 miles from the coast, mountains rise from the plains, the principal being Gunong Tupei and, 10 miles southward of it, Gunong Bubu. Gunong Hijau, about a mile eastward of Gunong Tupei, and 4,678 feet above high water, is seen over the latter. Gunong Pondok, a sugarloaf-shaped limestone mountain, 1,800 feet above high water, and $2\frac{1}{2}$ miles southward of Gunong Tupei, appears in the pass between Tupei and Bubu ranges. It is seen only between the bearing of E. $\frac{1}{3}$ S. and E. by N. $\frac{2}{3}$ N., or when off Lárut river. Except in the rainy season (from about June to November) the summits are seldom visible. Lat. 4° 52½′ N. Long. 100° 48¼′ E.

COAST.—Between Lárut river and Dinding islands the three principal streams are the Trong, Jarum Mas, and Bruas, fronted by the mud bank extending from 5 to 9 miles off shore. The Trong and Bruas are navigable by canoes for nearly 60 miles, the Jarum Mas is merely a tidal estuary.

Boundary.—The boundary between Perak and Dindings territory is on the south bank of Kwala Jarum Mas, thence in a direct line to Gunong Sunting Baloh. Lat. 4° 31′ 50″ N. Long. 100° 37′ 40″ E.

False Dinding is formed by the two highest peaks of a short range of hills near the coast about 9 miles north-north-eastward of pulo Pangkor, and by a vessel approaching from the northward are seen before pulo Pangkor, which they much resemble. Lat. 4° 23′ N. Long. 100° 36′ E.

Pulo Talang, a small islet lying a quarter of a mile from the coast near False Dinding, is on the eastern edge of a bight in the mud bank. About 2 miles westward of pulo Talang is the north extreme of a narrow bank, with depths of from 6 to 18 feet over it, which extends 8 miles in a northerly direction from pulo Pangkor, with a channel with somewhat deeper water between it and the shore.

TANJONG HANTU, the north point of the north entrance to Dinding channel, about 3 miles northward of pulo Pangkor, is a sloping point, the summit of which is 757 feet above high water. Chart, 792 [2,517]. Var. 0° 45′ E.

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Chart, 792 [2,517].
Lat. 4° 18½′ N.
Long. 100° 33¼′ E.
Var. 0° 45′ E.

LIGHT.—On the extreme of tanjong Hantu, a brick tower 20 feet in height and painted grey, exhibits at an elevation of 180 feet above high water, a *white occulting* light with a period of system of *ten seconds*, showing light for *seven seconds* followed by an eclipse of *three seconds* duration; it should be visible, in clear weather, from a distance of 10 miles.

Coast.—The coast from tanjong Hantu to Motts point, the north entrance point of Dinding river, is skirted by a shallow bank, having depths of from 3 to 12 feet, and extending a distance of from 6 to 8 cables; it gradually diminishes its distance from the shore southward of Mudge bluff as Motts point is approached, and becomes dry in patches, at low water, spring tides, at one mile north-westward of that point.

PULO PANGKOR, or Great Dinding island, is 5 miles in length in a north and south direction, 2 miles in breadth, and separated from the mainland by Dinding channel, about a mile wide, but narrowed by banks to about 3 cables; this channel affords secure anchorage for all classes of vessels.

Lat. 4° 14¾′ N.
Long. 100° 33½′ E.

The island is mountainous and densely wooded, the highest part, situated about 2 miles from the north point, being 1,318 feet above high water. On the north and south extremes are two hills respectively 748 and 992 feet above high water. Two other mountains rise near the centre of the island, and attain heights of 1,241 and 1,166 feet.

Pulo Pangkor and the adjacent coast, commencing at pulo Katak and extending 22 miles in a northerly direction, is British territory.

Islets and Banks.—North bank having depths of from 3 to 15 feet over mud and sand, with one patch dry at low water, lies in the north entrance of Dinding channel, and, with the shallow bank which skirts the mainland adjacent, nearly fills the north entrance of the channel. Its southern extreme lies half a mile north-east from Scorpion point, pulo Pangkor.

Wedge rock, 3 feet above high water, lies on the west edge of North bank, and S.W. $\frac{7}{8}$ W., distant $1\frac{1}{10}$ miles from tanjong Hantu lighthouse.

An outlying patch with 3 fathoms water over it, is situated W. by S. $\frac{1}{8}$ S. distant 7 cables from Wedge rock.

Buoy.—The southern prong of North bank is marked on its western side by a conical-shaped buoy, painted white; the position of this buoy should not be depended on.

North-west islet (Pulo Trendah), 100 feet above high water, is small, thickly wooded, and lies 5 cables distant from the north-west point of pulo Pangkor; at three-quarters of a cable distant from

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the west side of North-west islet there is a rock with 3 feet water over it. Pulo Pelanduk, a small islet, 7 feet above high water, lies nearly midway between North-west islet and pulo Pangkor. Chart.792 [2,517]. Var. 0° 45′ E.

North point.—The shore of pulo Pangkor, between North-west point and North point, is bordered by a shallow flat, on which, about midway between the points, is situated Grasshopper islet (pulo Plando), 121 feet above high water, and wooded.

Off-lying rock, 2 feet above high water, and half a cable in extent, lies East distant 2 cables from North point, with depths of from 5 to 8 fathoms between.

Telok Dalam lying westward of Scorpion point is shallow, having only from 6 to 9 feet water on a line joining the entrance points; at its head there is a fishing village and a cocoa-nut grove. A spit extends about 2 cables north-eastward and eastward of Scorpion point.

Charybdis rock, a pinnacle having a depth of 2 feet over it, lies $1\frac{1}{4}$ cables northward from Scorpion point; the ground is foul between.

Bower patch, with $2\frac{1}{2}$ fathoms water over it, is about half a cable in diameter, and lies on south side of the fairway, N. by W. $\frac{1}{8}$ W., distant 3 cables from Scorpion point. The summit of North-west islet, midway between North point and Off-lying rock, bearing N. 69° W., leads northward of Bower patch in 4 fathoms least water.

Table rock, 22 feet above high water, is situated one mile south-eastward of Scorpion point, and about one cable from the south point of Telok Chumpada, a shallow bight.

Port Pangkor.—The settlement at Pangkor, on the east side of the island, consists of a police station and a few houses scattered on the beach; the ground in the vicinity is swampy and unhealthy.

Pangkor, and Raja Bajan village to the southward of it, are inhabited by native fishermen and their families.

Small vessels may be readily and safely grounded for examination or slight repairs between tides.

LIGHT.—A *red fixed* light is shown from a beacon standing on Hospital rock, southward of Pangkor settlement. Lat. 4° 13′ N. Long. 100° 34½′ E.

Communication.—Most of the local steamers which run between Penang and Perak river call at port Pangkor, as do also some of those running between Penang and Singapore; there is thus almost daily communication with Penang.

Supplies.—Poultry, eggs, fruit, and pigs occasionally, may be procured at most of the native villages at reasonable prices; fish are

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Chart,792 [2,517]. Var. 0° 45′ E.

obtainable and may be taken with the seine in the bays, and turtle may be caught in the season. Firewood is procurable.

Anchorage.—Abreast of Pangkor village there is secure anchorage for vessels of deep draught, and sufficient space for several vessels to moor. A good berth is in 9 fathoms water, over mud, with the mouth of Sungi Penang bearing about West, distant 2½ cables, and the same distance from the edge of East bank.

Bathing is unsafe on account of alligators.

Lat. 4° 15½′ N. Long. 100° 35′ E.

The mainland.—Motts point, the northern entrance to Dinding river, is 357 feet above high water; and Lloyd rock, a pinnacle, awash at low water, spring tides, with 6 to 8 fathoms around it, lies 4 cables West of the point.

Dinding river has a deep and clear entrance, excepting Lloyd rock; and between Mehegan and Motts points it is 8 cables wide. The deep water passage between North and East banks has a depth of about 4¼ fathoms at low water, thence a channel 2 cables wide, and having from 5 to 9 fathoms, extends 3 miles up the river, the farthest point reached by the surveying parties. Yellow cliff, 14 feet, and Red cliff, 26 feet above high water, both on the south bank of the river, are conspicuous.

Lumut, situated on the south bank of the river at about 2 miles above its entrance, is the headquarters of the administration. Here are the treasury, court-house, public offices, police barracks, and hospital.

Pier.—There is a small wooden pier, with a depth of 5 feet alongside at low water, spring tides.

Lat. 4° 14¼′ N. Long 100° 37¾ E.

LIGHT.—A *red fixed* light is exhibited from the pier end, and, in clear weather, should be visible from a distance of 2 miles.

Communication.—There is almost daily communication with Penang by steamers calling at port Pangkor.

Supplies.—Poultry, eggs, fish, and vegetables are procurable in small quantities.

Anchorage may be obtained off the settlement in from 6 to 7 fathoms water, and there is not less than 4 fathoms at low water in its approach.

PULO KATAK, a small wooded islet, 77 feet above high water, stands on the edge of the bank near tanjong Katak, at the south entrance to Dinding channel, and is separated from the mainland by a shallow and rocky passage nearly 4 cables wide.

Lat. 4° 9½′ N. Long. 100° 36¾ E.

LIGHT.—A masonry tower, painted white, on pulo Katak, the east side of the southern entrance to Dinding channel, exhibits, at an

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elevation of 114 feet above high water, a *fixed* light, showing *white* from the bearing of S. 54° E. to N. 37° E., *red* from N. 37° E. to N. 53° W., again *white* from N. 53° W. to S. 37° W.; and is obscured elsewhere. The *white* light should be visible, in clear weather, from a distance of 10 miles, and the *red* from a distance of 5 miles. Chart, 792 [2,517]. Var. 0° 45′ E.

Coast.—The coast between False Dinding and pulo Katak is rocky with undulating hills close to the sea.

Boundary.—At pulo Katak is the southern boundary between Dindings territory and Perak state; thence N.E. by N. for about 5 miles.

DINDING CHANNEL.—Depths.—The southern entrance to Dinding channel, to Pangkor the settlement on the east side of the island, is deep throughout, but the northern channel, though it has a depth of 4 fathoms at low water, is not recommended for vessels above 18 feet draught.

East bank, commencing nearly a mile north-westward of Mehegan point, the south entrance point of Dinding river, is a narrow tongue, about 2 miles in length, dry in places, and has a S. by E. direction, joining the main body of the East bank nearly half a mile eastward of Hospital rock; from this the edge of East bank, with depths of from 3 to 15 feet, has a south-south-east direction, forms the east side of Dinding channel, and gradually approaches the mainland till at Symonds point it is only distant from it about a cable.

LIGHT.—At the north extreme of East bank and N. by E. $\frac{7}{8}$ E. 8 cables from Table rock, a *red fixed* light is exhibited from a screw pile beacon, and should be visible, in clear weather, from a distance of 5 miles. Lat. 4° 15½′ N. Long. 100° 34½′ E.

Fishing stakes.—There are numerous fishing stakes on East bank.

Directions.—North entrance.—The northern entrance is not recommended for vessels of more than 18 feet draught, for although there is not less than 4 fathoms water, yet the passage is narrow, being only about one cable wide with that depth, and 2 cables wide with depths above 3 fathoms. When the sun is in a favourable position for showing up the shoals the eye is the surest guide, and due attention should be paid to the speed of the vessel and to the set of the tidal stream.

Approaching the northern entrance, the north peak of pulo Pangkor should not be brought to bear southward of S.E., which leads well to the westward of North bank. North-west islet will be sighted ahead on this bearing, and passing it on the starboard hand at one cable distant, steer to pass half a cable northward of Off-lying rock, then bring the summit of North-west islet midway between Off-lying rock and North

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Chart,792 [2,517]. Var. 0° 45′ E.

point bearing N. 69° W. This mark astern will lead one cable northward of Bower patch, and one cable southward of North bank.

When Scorpion point bears S.W. $\frac{1}{8}$ W., or being nearly abreast of the white buoy at the south-east end of North bank, alter course to pass about $1\frac{1}{2}$ cables eastward of Table rock, and thence, preserving the same distance from the island, to the anchorage recommended off port Pangkor. (*See* page 180.)

If bound to Dinding river, still keep North-west islet midway between North point and Off-lying islet, and when Scorpion point bears S.W. $\frac{1}{8}$ W. sheer a little to the southward, to give the buoy at the south-east extreme of North bank a wider berth, and bring the leading mark on again, before the north end of East bank is approached, passing northward of the light beacon.

There is also a channel eastward of North bank; it may be approached by steering in for tanjong Hantu lighthouse bearing E. by S. $\frac{1}{2}$ S., until 3 cables from it, thence S.S.E. $\frac{5}{8}$ E. to Dinding river entrance. This channel is suitable for vessels of 10 feet draught, but should not be taken without local knowledge.

Lat. 4° 8½′ N. Long. 100° 35′ E.

South entrance.—From the southward, when between Fairway rock and pulo Katak, steer to bring tanjong Hantu open eastward of Table rock, bearing N. 14° W., which mark will lead in mid-channel to the anchorage off port Pangkor. *See* view on chart.

If wishing to enter Dinding river, steer from the anchorage to pass Table rock 2 cables distant, and thence midway between East bank and the island, until the north summit of pulo Pangkor bears S.W. $\frac{1}{2}$ W.; keep that mark astern until the summit of North-west islet is between North point and Off-lying islet, N. 69° W., which leads over the bar in not less than 4 fathoms water, northward of East bank light beacon; thence proceed in mid-channel into the river and to the anchorage off the settlement of Lumut.

Tides.—It is high water, full and change, in Dinding channel at 3h. 15m.; springs rise 9 feet, neaps 5 feet.

Tidal streams.—The flood, or south-going, stream sets fairly through the channel at rates of from 2 to 3 knots at springs. In Dinding river both the flood and ebb set at the rate of $3\frac{1}{2}$ knots at springs, and 2 knots at neaps.

South-westward of Great Dinding the flood sets south-eastward, and the ebb north-westward, and through the narrow passage between pulo Pangkor Kechil and Great Dinding at the rate of 2 to $3\frac{1}{2}$ knots at springs.

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WEST ANCHORAGE.—Telok Nipah.—The west of pulo Pangkor is deeply indented, the depths in the bays however are comparatively shallow. On this side of the island, in Telok Nipah, sheltered from the southward by Long island, a fair anchorage may be obtained in 4 fathoms water over sand, 2 cables from that island: this anchorage is sheltered from all winds, except those from W.S.W. to North. Chart, 792 [2,517]. Var. 0° 45′ E.

Between pulo Pangkor Kechil (Little Dinding island), which is 480 feet above high water, and one mile in length, and pulo Pangkor there is good holding ground in a depth of 3½ fathoms, at 2½ cables from the main island, with the north extreme of Little Dinding bearing W. ¼ N.

On the south and west sides of pulo Pangkor, without entering the bays, deep water will be found within a cable of the shore.

Fairway rock, 27 feet above high water, lies S. by W. $\frac{5}{8}$ W. distant $3\frac{8}{10}$ miles from the south-east point of pulo Pangkor; a sunken rock lies half a cable from its north side. There are depths of from 9 to 16 fathoms between the rock and the mainland, and 10 to 20 fathoms between the rock and pulo Pangkor. Chart, 1,009 [2,518]. Lat. 4° 7½′ N. Long. 100° 33¼′ E. Var. 0° 50′ E.

COAST.—From tanjong Katak the coast is low, covered with jungle, and forms a bight, in which are several villages, and continues to the entrance of Perak river, situated about 14 miles south-eastward of pulo Pangkor. Between tanjong Katak and tanjong Kapak, 7 miles south-eastward, there is a sandy beach fronted by mangroves. The bight is skirted by a bank, which, extending 2 to 5 miles from the coast, nearly blocks up the entrance of Perak river.

PERAK RIVER rises in Siamese territory, near the source of Muda river, the northern boundary of Wellesley province, and trends southward with many tortuous windings past Kota Tampan, Kota Lama, Kwala Kangsa, and other towns for about 100 miles to Durian Sabatang, from whence it takes a westerly direction to Malacca strait; the banks of the river are mostly low and covered with jungle.

The river inside is wide and deep, and navigable for vessels of 11 feet draught as far as Telok Anson, about 30 miles from the entrance, and about 5 miles below Durian Sabatang by the river, and three-quarters of a mile by the road. Vessels of the draught mentioned can reach Durian Sabatang, but the channel is difficult. Steam launches can proceed to Kota Lamut, about 5 miles beyond.

Its chief importance arises from the tin mines of Lower Perak and Kinta.

LIGHTS.—Pulo Katak light, *see* page 180.

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Chart, 1,009 [2,518].
Lat. 4° 5¼′ N.
Long. 100° 44½′ E.
Var. 0° 50′ E.

Denison beacon.—From Denison screw pile beacon, on the east side of eastern channel of Perak river, a *white fixed* light is exhibited, at an elevation of 45 feet above high water, and should be visible, in clear weather, from a distance of 8 miles. It is situated on the west edge of the one-fathom bank with tanjong Kapak bearing N. by W. $\frac{7}{8}$ W., distant $2\frac{4}{10}$ miles.

Lat. 3° 59¾′ N.
Long. 100° 45¼′ E.

Bagan Datoh.—Within the entrance on the south side, abreast tanjong Kupong, is Bagan Datoh light, exhibited from a mast with trestle, painted white, at an elevation of 50 feet above high water. It is a *fixed* light showing *red* seaward from the bearing of N. 70° E. to S. 21° E.; *white* from S. 21° E. to S. 70° W.; obscured from S. 70° W. to N. 21° W., and again shows *white* from N. 21° W. to N. 70° E. The *white* light should be visible in clear weather from a distance of 8 miles and the *red* light 4 miles.

Channels.—The eastern channel, with 10 feet at low water, is the most navigable and the one always used; it lies near the north shore, at about 1½ miles south-westward of tanjong Kapak and about the same distance off the shore of the bight.

Seaward of the eastern channel the mouth of Perak river is encumbered with flats, dry in places, and on which at times, during the south-west monsoon, the sea breaks heavily. There is a passage known as the Southern channel southward of these flats with a depth of 8 feet at low water, over hard sand, but it is very narrow and of no use unless buoyed.

CAUTION.—As the flats may be liable to shift caution is necessary when entering; also to avoid the numerous fishing stakes.

Buoy.—A conical shaped buoy, painted white, moored in about 10 feet water, 4 cables south-west of Denison beacon light, marks the north-east edge of the middle flats; the channel is between the buoy and the beacon.

Directions.—From the northward, having passed pulo Katak, steer to bring the south point of pulo Pangkor nearly touching the north point of pulo Pangkor Kechil bearing N.W. by W. $\frac{1}{8}$ W., which mark astern will lead northward of the outer fishing stakes, in 10 feet least water.

Coming from the southward, pulo Nipis, the western island of the northern group of Sembílan islands (262 feet above high water) should be open northward of pulo Agas, the eastern island of that group, bearing S.W. by W. $\frac{3}{4}$ W., before bringing the mark above mentioned, astern.

The pile beacon should be steered for as soon as seen, bearing E.S.E. until within 2 cables of it, thence with Bagan Datoh light mast bearing S. by E. $\frac{3}{4}$ E. between the beacon and the white buoy, which will lead over

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the bar in about 10 feet at low water, spring tides. The deepest water is on the eastern side of the channel; fishing stakes border both sides. Chart, 1,009 [2,518]. Var. 0° 50′ E.

Approaching tanjong Kupong, keep to the southward of the latter bearing; and when the entrance is well open alter course up the river, keeping about 2 cables from the south shore until past the long shoal, with about 4 feet least water, lying nearly in mid-channel, when cross over and keep the concave bank of the river to Kota Satia. The first reach in the river is the shallowest (about 10 feet at low water) between the entrance and Telok Anson, a distance of about 30 miles. There is a channel northward of the mid-channel shoal, but it is not usually taken by local traders.

Kota Satia.—Anchorage.—There is anchorage off Kota Satia, in about 3 fathoms water, over mud, at about 2 cables from the shore, but a bank, with a depth of 6 feet over it, lies in mid-channel off Kota Satia, with a red tiled house bearing about S.E. ½ E. Lat. 4° 2′ N. Long. 100° 51½′ E.

Directions above Kota Satia.—As is usual in most rivers, deep water will be found in the bights or concave sides and shoaler water off the points, and this rule should here be followed, remembering that the positions of banks in the river are liable to alteration by the freshets.*

Leaving Kota Satia keep close to that shore until southward of the mid-channel patch, then cross to the concave bank of the river; from abreast the first point steer about mid-channel.

Depths of 6 to 11 fathoms will be obtained in the channel between Kota Satia and Batu Rabit.

Single-tree point, nearly a mile below Batu Rabit and distinguished by a white board fastened to a tree, should be given a good berth, and after rounding it steer in for Batu Rabit, which will then be in sight in the bend on the left bank, but keeping the left bank on board until tanjong Rembia the first point above Batu Rabit is neared, then sheer over to the right bank until the point is rounded.

Return again to the left bank and keep it close on board until abreast the Cocoa-nut grove on that bank in the next bend, just below Telok Menintam, then steer across to the opposite bank for the white board on a tree, on reaching which steer across to a similar board on the left bank, and keeping that bank to the end of that (Long) reach, where is the new settlement.

Telok Anson,† the new settlement, is on the left bank of the river, at three-quarters of a mile by a good road from Durian Sabatang, and 30 miles from the entrance to the river. It consists of numerous wooden houses with tiled roofs, a custom house and police barracks; the magistrate of the district resides here. Trade is carried on by Chinese Lat. 4° 2′ N. Long. 100° 59′ E.

General chart, 1,355 [2,513].

* The directions above the entrance to Perak river are very old, and must be used with considerable caution.

† Named after General Anson, a former Governor of Penang.

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Chart, 1,009 [2,518]. Var. 0° 50′ E.

who supply the tin miners in the interior. Tin is the principal export, and is brought from the mines situated 60 miles up the Bidor river, and 6 miles from its banks. This river enters the Perak at Durian Sabatang.

Communication.—There is frequent communication to Singapore, and twice every week with Penang by coasting steamers; a railway runs to Pedang Rengas, a distance of 90¼ miles, joining the main railway system of Perak, and there is telegraphic communication. (*See* Chapter I., page 14.)

Supplies may be obtained from Penang on short notice, and good water from the Government waterworks.

Anchorage may be obtained close off the settlement in 6 or 7 fathoms water, but a shoal extends from the opposite point nearly half way across the river.

Vessels do not usually proceed beyond this anchorage.

Lat. 4° 3′ N. Long. 101° 0′ E.

Durian Sabatang.—Beyond Telok Anson the channel to Durian Sabatang is difficult, owing to the narrow passage between the sandbanks and the absence of landmarks. The channel is close in to the right bank when clear of the shoal point abreast Telok Anson, until a small island is reached, and which must be kept close to on the port hand; when abreast an opening in the jungle, or one cable northward of the islet, the houses of Sabatang will be seen opening of Padamar point, when steer direct for the point allowing for the tidal stream, and keep close to that shore up to Sabatang.

Great care is necessary in making this crossing, the deep channel being very narrow, and the sandbanks on each side dry at low water. The least water found by the *Ringdove* (1875) in the channel at low water, spring tides, was 8 feet.

Durian Sabatang, formerly the settlement, and the highest point which may be reached by vessels drawing 11 feet, is about 35 miles from the entrance. Most of the former inhabitants have removed to Telok Anson, where all the trade is carried on. There is just room to moor off Durian Sabatang, but the place is now seldom visited.

Water is of indifferent quality; the best is obtained from a stream flowing over the sandbank opposite the village. The water in the river is fresh from 2 miles above Kota Satia.

Residency.—The residency is at Kwala Kangsa, about 72 miles above Telok Anson, on the right bank of the river, and 22 miles distant from Taipeng by road; the journey by the river is long and tedious.

Lat. 4° 11′ N. Long. 101° 0′ E.

Kinta river, a tributary of the Perak. Commander Singleton remarks that "returning on the 6th January 1875, from service with "the Naval Brigade at Kinta, the river was found to be greatly swollen "from the few previous days' rain, and the sandbanks, which there had

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been great difficulty in passing when going up, had then sufficient water to allow of boats going over them. The British residency on the island "off Bandar Bharu was entirely flooded, and the guns landed were "entirely under water. The river, which had risen at least 20 feet, fell "suddenly about the 10th January, and owing to the shifting bottom (fine "sand) the entire course was altered. The current on this occasion ran "at the rate of 5 or 6 knots." Chart, 1,009 [2,518]. Var. 0° 50′ E.

Tides.—It is high water, full and change, at the entrance to Perak river at 3h. 15m., springs rise about 9 feet, and neaps 5 feet, and at Durian Sabatang at 5h. 45m., springs rising 12 feet. From January to March the tide falls about 2 feet lower than the average spring.

Tidal streams.—In the lower reaches of the river the ebb streams runs at the rate of 2½ knots and at Durian Sabatang at rates of from 2½ to 3 knots an hour, but the duration of the streams vary considerably, depending on the rains. The tides are felt as far up as the entrance of Kinta river.

SEMBILAN ISLANDS, lying to the westward of the entrance of Perak river, occupy a space of 6 miles in a north-east and south-west direction; they are mostly small, bluff, high islands, covered with trees, "steep to," and may be seen from a distance of 20 miles. There are some small sandy beaches on the larger islands, but landing is difficult on account of the reefs fronting them.

The northern group consists of four islets and a rock, pulo Nipis the western islet being 262 feet, and pulo Agas, the eastern, 136 feet above high water; pulo Payong, 163 feet above high water, lies nearly one mile south-westward of pulo Agas. Lat. 4° 3½′ N. Long. 100° 32′ E.

Rosa rock, with 9 feet water over it, lies with pulo Payong bearing N.W. ⅔ W., distant 6 cables, and the summit of pulo Rumbia (southern group) S.W. ⅝ W.

The southern group consists of six islands and two off-lying rocks.

Pulo Rumbia, 615 feet above high water, the largest of the islets, has two peaks of nearly equal height; pulo Lalang, 388 feet above high water, is in two portions, joined by a reef which dries at low water. Two islets, 80 and 20 feet above high water, lie westward of pulo Lalang, and a rock which dries 2 feet, lies 2 cables southward of the southern one.

Pulo Buluh, the southern islet, 460 feet above high water, has a flat top. Black rock, 8 feet, is situated about 4 miles west-north-westward of pulo Lalang, and White rock, 35 feet above high water, lies 1½ miles in the same direction from pulo Buluh; they are about one mile apart in a north and south direction. The channels between the southern group of islets have not been examined. Lat. 4° 0′ N. Long. 100° 31½′ E.

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Chart, 1,009 [2,518]. Var. 0° 50′ E.

The edge of the bank of 3 fathoms, which lies off Perak river, is about 4½ miles distant from the nearest of the Sembilan islands.

At night the Sembilan islands should be approached with caution, as the depths are from 20 to 25 fathoms close-to and between them.

Chart, 793 [2,515]. Lat. 3° 59′ N. Long. 100° 6′ E.

PULO JARAK, lying near the middle of Malacca strait, about 25 miles westward of pulo Buluh, is a precipitous, thickly wooded island, half a mile in length, east and west, nearly 3 cables in breadth, and 508 feet above high water; in clear weather it is visible from a distance of 26 miles. It is "steep-to" except at the north-east extreme, where boulders, some above water, extend nearly one cable off. The least depths are close off the north-west and south-east extremes, where there are about 20 fathoms.

Anchorage.—There is a depth of 24 fathoms at about 7 cables northward of its west extreme, with a bottom of mud and broken shells where fair anchorage is obtainable; the depths elsewhere around the island are from 35 to 60 fathoms.

Tides.—It is high water, full and change, at 2h. 30m.; springs rise 7 feet. Tidal rips were observed eastward of the island.

Tidal streams.—The flood stream sets south-eastward and ebb north-westward at the rate of about 1½ knots an hour.

General directions.—During the north-east monsoon, north and north-east winds frequently blow strongly between pulo Jarak and the islands at the north end of Malacca strait; sailing vessels, therefore, from the southward during that period, should, after passing Dinding islands, keep near the edge of the mud flat which fronts the coast, so that they may not be delayed by the strong wind and short sea likely to prevail in the offing near Penang.

Vessels bound south-eastward should pass between pulo Jarak and the Sembilan islands, for the current often sets strong to the north-west in the middle of the strait, and calms are more prevalent there than near the coast; thence shape course to pass westward of North Sands and for One-fathom bank; *continued* at p. 205. (Klang strait, *see* p. 191.)

COAST.—Between Perak river and Selángor river the coast is low, covered with jungle, and skirted by a mudbank, on the edge of which a depth of 3 fathoms is found at from one mile to 5 miles off.

Fishing stakes.—Enclosures for capturing fish, 30 or 40 yards square, consisting of bamboo, strengthened by cross poles, and having a solid platform well above the water, are situated off and along the coast, a few miles apart. They are generally in about 5 fathoms water, rarely

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in less, and are therefore useful in pointing out where the water is shallow. (*See also* page 38.) Chart, 1,009 [2,518]. Var. 0° 55′ E.

BERNAM RIVER, the entrance to which is situated about 13 miles southward of the entrance of Perak river, is one of the finest on the Malay coast, has 17 feet on the bar at high water, and is said to be navigable for steam launches for about 100 miles; the snags would then prevent further progress.

The 3-fathoms edge of the shore mud bank extends 3 miles off the mouth of the river.

Boundary.—The Bernam river is the boundary between Perak and Selángor.

LIGHT.—A *white fixed* light is exhibited from a white lighthouse, on the north point of entrance to Bernam river, at an elevation of 25 feet above high water, and should be visible, in clear weather, from a distance of 4 miles. Lat. 3° 50½′ N. Long. 100° 47½′ E.

Directions.—The lighthouse can be distinctly seen at 3 or 4 miles distant, showing conspicuously against the dark green trees behind, and should be steered for when bearing N.E. ½ N., which leads in the deepest water over the bar, passing between the fishing stakes.

In the first reach, which is long and shallow, mid-channel should be kept; afterwards following the bends of the river, and avoiding the points. The deepest water is almost invariably close in to where the nipa palms grow and shoalest where there are mangroves.

H.M.S. *Moorhen*, drawing 10½ feet water, crossed the bar of Bernam river in February 1877, and proceeded as far as the village of Sabah, about 20 miles from the entrance. The vessel crossed at one hour before high water, had a depth of not less than 16 feet on the bar, and 17 feet, over bottom soft mud, in the channel to Sabah, where she moored in 5¾ fathoms water. The tidal streams run strongly in the river.

SELÁNGOR RIVER has a depth of about 15 feet at high water, spring tides, in its entrance, and is nearly dry at low water. It is usually navigable for steam vessels, drawing 8 feet water, to kampong Siar, a distance of 14 miles, and for boats about 19 miles. Chart 794 [2,519].

The entrance to the river may be recognised by Selángor hill, situated on the peninsula forming the south side of the entrance; the hill is high, conspicuous, covered with trees, and surmounted by a fort. The coast mud bank extends across the mouth of the river; its outer edge of 18 feet is about 3 miles westward of the entrance.

LIGHT.—A *white fixed* light is shown from a small house in the fort, and should be visible, in clear weather, from a distance of 10 miles, but the fort is greatly hidden by trees. Lat. 3° 20½′ N. Long. 101° 15′ E.

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Chart,794 [2,519].
Var. 1° 0′ E.

Settlement.—The magistrate resides in the fort on Selángor hill and the settlement is at the foot of the hill, about 3 cables within the south point of entrance; there is a Malay village on the opposite point. The population of the district is about 7,000.

Beacons.—The best channel, with about 15 feet at high water, spring tides, is marked by two rows of beacons, about one cable apart, the outer one, white, being placed in 5 feet water. The beacons are painted white and surmounted by balls on port hand, and red, surmounted by crosses on starboard hand, when entering.

Trade.—The exports are tin, guttapercha, gharuwood (lignum aloes), ivory, bark, hides, salt fish and rattans; the imports are rice, salt, opium, tobacco, tea, and oil. Tin is brought by boats from the mines up the river, and taken to Singapore by coasting steamers.

Lat. 3° 21′ N.
Long. 101° 14¼′ E.

Directions.—Vessels entering Selángor river should approach with the conspicuous tree on the south point of entrance bearing N.E. by E. $\frac{1}{8}$ E., passing between the red and white beacons and fishing stakes, and northward of the beacon marking the edge of the bank off the south point; thence steer for the village, about 3 cables within the point. The holding ground is bad, being very soft mud.

Selángor river is usually navigable for steam vessels of 8 feet draught, for 14 miles, or as far as kampong Siar, as before stated, but there is little room to swing there; the bottom is soft mud. There is no danger in the river for a vessel of that draught, except a mud-bank with a depth of 3 feet water over it, and deep water close to the shore on either side, situated about 3 or 4 miles from the entrance, off Telok Penjamon. Above kampong Siar there are several sand banks, but the river is navigable for cargo boats a further distance of 55 miles.

The river is tortuous in its course, the banks are low throughout, and lined with attap and mangrove trees, and the deepest water is found on the concave side.

Tides.—It is high water, full and change, at Selángor river at 5h.; springs rise 15 feet, neaps 12 feet.

Tidal streams.—The flood stream runs 5 hours, the ebb for 7 hours, sometimes attaining the rate of 5 knots an hour.

COAST.—Between Selángor and Klang islands the coast is thickly wooded, low, and flooded in most parts at high water. It is skirted by the mudbank, already mentioned, which is dry at low water, and extends 3 miles from the coast northward of Botel islets, gradually nearing the shore to the southward.

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KLANG STRAIT.—The northern entrance to Klang strait is between pulo Angsa and the Botel islets; the southern between pulo Pinto Gedong and pulo Lúmut. The strait, divided into two parts, namely, the North Klang strait and the South Klang strait, is available for vessels of deep draught, and presents no difficulties. Chart, 3,453 [2,532]. Var. 1° 0′ E.

It is about 14 miles in length, and, in its narrowest parts, from a quarter to half a mile in breadth; the least depth is 4 fathoms at low water, in the fairway.

Banks extend off each side at the southern entrance; on either side of the channel abreast pulo Labuan Kurap; off the point opposite Deepwater point, and off tanjong Bakau, whilst a bar, with from 18 to 20 feet at low water, stretches right across the entrance to port Swettenham.

North Klang strait forms a large and commodious harbour, free from dangers, and has deep water on the eastern shore close up to the bank, where it is proposed to build wharves. There is good anchorage anywhere, with room for a large number of vessels.

Botel or Bottle islets, a group of four, consisting of pulo Besar, 105 feet above high water, pulo Anak Angsa, pulo Jummo and pulo Tekuko, are situated on the coast mud bank, on the east side of the northern entrance to Klang strait, pulo Tekuko, the outer one, being $1\frac{3}{4}$ miles from the shore; interspersed amongst the islets are rocks awash at low water. This area should not be approached, and may be easily avoided by a bearing of Sail rock beacon which shows up well.

Sail rock, half a cable in diameter, dry at low water, spring tides, and "steep-to," lies $6\frac{1}{2}$ cables south-west from pulo Tekuko, the south-western islet; it may be approached to a distance of a cable on its western side. Lat. 3° 11¾′ N. Long. 100° 16′ E.

Beacon.—Sail rock is marked by a moderate sized beacon, 18 feet in height and painted grey.

Fishing stakes extend from Sail rock into deep water.

Pulo Angsa (Mudamus) consists of two wooded islets lying $5\frac{1}{4}$ miles off shore on the west side of northern entrance to Klang strait, and on the eastern edge of the bank which, within a depth of 3 fathoms, extends about 21 miles north-west of pulo Klang. Caution is necessary in approaching the eastern edge of this bank, as it shoals very suddenly from deep water to about one foot.

LIGHT.—A cylindrical tower, painted white, on pulo Angsa, north islet, exhibits, at an elevation of 120 feet above high water, a *white flashing* light with a period of system of *ten seconds;* it should be visible, in clear weather, from a distance of 15 miles. It is proposed to extend the range of visibility of this light. Lat. 3° 11¼′ N. Long. 100° 13¾′ E.

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Chart, 3,453 [2,532]. Var. 1° 0′ E.

Anchorage.—There is anchorage close south-eastward of the light-house, but deep water a short distance off.

Pulo Klang, low and wooded, about 7 miles in length, and 4 miles in breadth, with the mainland, forms the northern part of South Klang strait, which is at this part nearly one mile wide. On the south-west side of pulo Klang, and extending 5 miles south-westward, is a group of islands, forming the western side of South Klang strait, the southernmost being Pinto Gedong. All these islands are low, formed of black mud, and covered with mangroves.

Pulo Klang, together with the islands mentioned, are situated on the south-eastern side of an extensive mud bank with depths of from 3 feet to 3 fathoms, which extends 21 miles north-west of pulo Klang, and breaks at half tide. This bank dries for nearly 3 miles north-west and 6 miles south-west of the islands.

LIGHTS.—A *red fixed* light may be shown from the signal station at tanjong Sau (Deepwater point), the south-east point of pulo Klang, but it is unreliable.

Lat. 20° 54′ N. Long. 101° 15′ E.

A *white fixed* light is exhibited, at an elevation of 30 feet above high water, from a wooden framework erected on the south-east extreme of pulo Pinto Gedong, forming the south-west point of entrance to South Klang strait. It should be visible from the southward, in clear weather, from a distance of 10 miles when bearing northward of N. 70° E., eastward of which it is obscured by trees.

Beacons.—A tripod beacon, surmounted by a staff and ball, the whole painted white, marks the edge of a spit extending northward of tanjong Bakau, the north-east point of pulo Klang, and similar beacons are placed on the north-eastern and south-eastern edges of the flat, extending from pulo Labuan Kurap on the western side of South Klang strait.

Shoal.—A middle ground $1\frac{2}{10}$ miles in length, with a least depth of 9 feet over it, is situated northward of tanjong Sau; it is not in the fairway for vessels using North Klang strait.

Signal station.—There is a signal station on tanjong Sau.

Pulo Lúmut is 9 miles in length, and forms the south-east side of South Klang strait; between its north-west point and tanjong Sau the strait is 3 cables wide between the 5-fathoms contour lines. Lúmut strait on the east side of pulo Lúmut is only used by launches.

Directions from the northward.—Bearings of Selángor, Bukit Jeram, and pulo Angsa will fix the position of a vessel, which should be done when approaching the bank extending north-westward of pulo Angsa, as the water shoals very suddenly towards it, and when entering the channel it is preferable to keep on the north-eastern side, using the lead.

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When pulo Angsa bears South it may be steered for, passing it at a distance of about 4 cables on its eastern side, but taking care not to shoal the water to less than 8 fathoms before reaching it. From pulo Angsa a S.E. $\frac{3}{8}$ E. course will lead in the fairway of the channel to tanjong Bakau (Green point), but pulo Angsa lighthouse must not be brought to bear northward of N.W. $\frac{3}{8}$ W. Chart, 3,453 [2,532]. Var. 1° 0′ E.

Tanjong Bakau may be rounded at a convenient distance to avoid the shoal extending about three-quarters of a mile northward of it, and a S. by E. course will lead down North Klang strait, but it is better to keep on the eastern side of the channel. As tanjong Sau is approached keep over towards it, passing between the middle ground and the bar at the entrance to port Swettenham, from which South Klang strait has a general direction, S.W. by S., but care is necessary to keep in mid-channel when passing through its narrowest part. Lat. 3° 4½′ N. Long. 101° 20′ E.

From abreast the shoals off pulo Labuan Kurap a mid-channel course will lead in deep water until tanjong Jimbujing is approached, and after passing it Second point should be kept just open of First point bearing N. 34° E., which will lead to sea in a least depth of 4 fathoms.

Care is requisite to avoid the shoal water lying off tanjong Buas Buas, the south-west extreme of pulo Lúmut; the south extreme of that point should be given a wide berth, and the course not be altered till pulo Pinto Gedong light structure bears to the eastward of North; the entrance is safe with this light bearing between North and N.E.

Caution should be observed in passing the south-east point of pulo Klang, as the tidal streams set strongly past the north end of pul Lúmut.

Working into Klang strait from Selángor road, sailing vessels should not stand into less than 4 fathoms water towards the shore, and 8 fathoms towards the bank which lies to the westward. Botel islands should not be approached within 1½ miles, the bottom being uneven, and Sail rock lying three-quarters of a mile south-west of pulo Tekuko must be avoided. (Beacon, *see* page 191.)

When about 4 miles southward of Botel islets, the coast may be approached to about a mile, but in standing to the westward vessels should not approach the bank to a less depth than 4 fathoms, and pulo Angsa should not be brought to bear northward of N.W. ¾ W. Should a vessel, however, ground here no damage will probably be sustained, the banks being of soft mud and the water invariably smooth.

From the southward.—When Parcelar hill (Jugra river) bears about E. by N. the entrance of South Klang strait may be easily discerned, the several points appearing as bluffs, the southernmost of which is

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Chart, 3,453 [2,532]. Var. 1° 0′ E.

tanjong Buas Buas; the light structure on pulo Pinto Gedong on the western side of the strait will also probably be seen.

The light structure should be approached bearing about N. by E. until about 1½ miles distant. Second point should be kept just open of First point, bearing N. 34° E., and the directions, from the northward, already given, be reversed for the remainder of the strait.

Vessels at night frequently mistake Kwala Salat Lúmut, the entrance to Lúmut strait, for that of South Klang strait, as it is often impossible to distinguish the points, but the light shutting in should show the error if in the entrance to Lúmut strait.

Tides.—It is high water full and change at the entrance to Klang river at 5 hours, springs rise about 14¾ feet, neaps 8¾ feet.

Tidal streams.—In the northern entrance to Klang strait, between pulo Angsa and the mainland, the flood sets to the south-south-eastward at the rate of 3 knots an hour at springs, and the ebb north-westward about 2½ knots.

The flood makes at the time of low water at One-fathom bank, and runs for 7 hours.

Off the southern entrance to Klang strait the tidal streams run very strongly, and in the strait itself at the rate of 4 knots an hour at springs.

Off Jugra river, southern approach to Klang strait, the flood sets S.E. and the ebb N.W. by W., at the rate of 1½ knots, turning at high and low water at One-fathom bank. *See* page 205.

Chart, 2,153 [2,520]. Lat. 3° 0′ N. Long. 101° 23½′ E.

PORT SWETTENHAM, the approach to Klang river from Klang strait, is about 1½ miles in length, and 3 to 5 cables in breadth, with depths of from 6 to 10 fathoms within half a cable of its southern shore, deepening to 20 fathoms between the entrance points, westward of which a bar, with 17 feet water over it, is reported to have formed, the exact position being unknown.

The northern shore is shallow, and there is a shoal extending off tanjong Dalik, the north-east point of pulo Lúmut, which must be carefully avoided by vessels turning to go alongside the wharves.

Town.—The town of port Swettenham, on the eastern side of the entrance to Klang river, is well laid out and drained, and contains the Harbour Master's house, Marine office, Rest House, and a number of other buildings; it is the terminus of the railway from Klang.

Communication.—Port Swettenham has regular steamship communication with Singapore, Malacca, port Dickson, Penang, and Telok Anson; railway communication with Klang (5½ miles) and Kwala Lumpor, thence with the other lines of the State, and telegraphic communication with all parts. *See* Chapter I., page 15.

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Supplies are difficult to obtain as they require to be ordered from Kwala Lumpor, but cold meat stores are to be built at port Swettenham. Excellent water can be obtained in any quantity from hydrants alongside the piers. Chart. 2,153 [2,520]. Var. 1° 0′ E.

Piers.—The northern, or passenger-pier, is constructed of iron screw piles, and southward of it are three T head piers with cylindrical piles; these T heads are to be joined together by long pontoons to afford additional accommodation; the depths, close alongside the pier heads, vary from 10 to 14 feet at low water, spring tides, but a vessel might have a depth of 7 fathoms on the off side. The railway is brought down to the piers.

Slip.—A slip for hauling up boats and steam launches is in course of construction.

Beacons.—A tripod beacon, surmounted by a staff and ball, the whole painted white, marks the 3-fathoms patch westward of tanjong Gila and nearly in the centre of the entrance to the port. The limits of the port are marked by six beacons surmounted by diamonds. Lat. 3° 0′ N. Long. 101° 21½′ E.

At the entrance on the North side a beacon is situated about a cable north-north-westward of tanjong Gila, and from it the beacon on the south side bears S.S.W., distant 4½ cables. Lat. 3° 0′ N. Long. 101° 21¾′ E.

There is a beacon a cable northward of tanjong Kubu, and one on the opposite bank of the entrance to Klang river, but the latter beacon is hidden by trees.

In Lúmut strait, a beacon stands on the southern side of sungi Aut from which a beacon on pulo Lúmut bears W. ¾ N., distant 4⅓ cables.

Anchorage.—There is good anchorage, in varied depths, anywhere in the harbour, but care must be taken not to obstruct the approach to the piers; if lying close to the town it is advisable to moor on account of the cross-currents, also, on certain days a number of steamers arrive. H.M.S. *Thetis*, 1905, anchored with the beacon, northward of tanjong Kubu, bearing N.N.E. and the railway pier N.E. by E. ½ E.

Shoal water extends about 1½ cables westward and nearly 2 cables southward of tanjong Kubu, the eastern entrance point of the river, on which there is a conspicuous white tank.

Directions.—Entering port Swettenham, the bar with 3¼ fathoms water must be crossed and, after passing the beacon on the south side of the entrance, and the shoal off that point, the deepest water is close along the south shore. If turning to the southward to go alongside one of the wharves, care must be taken to avoid the shoal off tanjong Dalik, and in proceeding alongside, the vessel's head should be turned up stream and an anchor let go.

Tides.—It is high water, full and change, in port Swettenham at 5 hours; springs rise 14 feet (approximate).

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Chart, 2,153 [2,520]. Var. 1° 0′ E.

Tidal streams.—In the approach to Klang river, the streams run from one knot to 4 knots at springs per hour, and even more after a freshet, the flood stream setting eastward to the river from 4 hours before to 2 hours after high water there.

Chart, 794[2,519].

KLANG RIVER.—The banks of Klang river for a distance of 30 or 40 miles in the interior are high and covered with mangroves and various sorts of palms. The river is from one cable to 4 cables in breadth, and free from danger for about 11 miles from the entrance, with a least depth of 6 feet at low water.

Vessels, of about 12 feet draught, could ascend to Bukit Kuda, 2 miles above Klang, and, those drawing 8 feet, for a distance of 10 miles beyond, but in 1904 it was reported that the depths at the entrance had decreased, also that vessels were not allowed to navigate the river.

Lat. 3° 2½′ N. Long. 101° 27′ E.

Klang.—The town of Klang, the head-quarters of the Collector, is situated at about 12 miles from the entrance, and defended by a fort on a hill; it is the centre of a large agricultural district, and rubber trees are being extensively planted. A spit extends about 20 yards off the pier, below the fort at Klang, narrowing the channel to about 80 yards.

Communication.—A railway connects Klang with port Swettenham and Kwala Lumpor; there is telegraphic communication with all parts, and by telephone with port Swettenham.

Wharves for the accommodation of vessels, have been built at Klang, and at Bukit Kuda 2 miles above.

Lat. 3° 8½′ N. Long. 101° 42′ E.

Kwala Lumpor, the capital of Selángor, where there is a British Resident, is distant from 36 to 38 miles by the river and 22 miles by the railway; it has a population of about 32,000, and is the seat of Government for the Federated Malay States, the Government buildings being the finest in the East. Electric light is to be installed.

Communication.—A railway, 22 miles in length, connects Klang and Kwala Lumpor, and from the latter place a system of cart roads extends to the boundaries of Perak, Negri Sembilan and Pahang.

Anchorage.—If there is not accommodation at the wharves, vessels moor head and stern off the town, in from 2 to 3 fathoms water, over mud, but the holding ground is bad. The river here is from 80 to 100 yards wide, and there is not room to swing without touching the bottom at low water.

Directions.—Vessels proceeding above tanjong Kubu keep mid-channel and follow the general rule of keeping in the bends and avoiding the points. Great care is necessary in approaching Klang, as the channel is narrow and the bends sharp; in the second bend below Klang the depth is but 6 or 7 feet at low water; the spit off the pier below the fort must also be avoided.

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Lúmut strait.—The eastern side of pulo Lúmut is separated from the mainland by Lúmut strait, half a mile wide, in which the tidal streams run with considerable strength. Chart, 2,153 [2,520]. Var. 1° 0′ E.

About half a mile south-westward of tanjong Dalik, the north-east extreme of pulo Lúmut there is a bank of hard sand in the fairway, which dries from one foot to 3 feet. Vessels cannot use this strait and launches can pass through it only at high water.

LANGAT RIVER has two mouths, one of which, the Langat, opens into Lúmut strait, the other, the Jugra, into the sea to the south-west of Parcelar hill. Chart, 794 [2,519]. Lat. 2° 55′ N. Long. 101° 21′ E.

In the Langat river the turnings are sharp and numerous; a good look-out must be kept for snags, and the services of a pilot are necessary. At about 1½ miles inside the entrance, and extending nearly across, is a sandbank having only a depth of 2 feet over it; the deepest water is very close to the starboard bank of the river, on entering; mud banks are continually forming in the river, and navigation is difficult for vessels over 6 feet draught.

H.M. Ships *Teazer* and *Midge*, 1871-74, drawing 8½ feet, ascended Langat river to Langat town, about 13 miles from the entrance, and at its junction with the Jugra. The *Teazer* moored opposite the Sultan's palace, a Malay entrenchment having a few guns, and had room to swing only in one direction.

Jugra river, the southern mouth of Langat river, enters the sea 10 miles south-eastward of Lúmut strait and has about 3 feet on the bar at low water, 3 to 8 fathoms within, as far up as Parcelar hill, and was navigable (1890) for vessels of about 7 feet draught for about 10 miles. The shore bank, extending 2 miles off the mouth of the river, is "steep-to," and shoals suddenly from about 15 fathoms to 3 fathoms; it is usually marked by fishing stakes.

There is another channel to Jugra village, situated about 4 miles westward of the Jugra, named the Ayer Itam, said to be navigable for vessels of 7 feet draught at all times.

LIGHT.—From an iron pillar painted white, standing on south point of entrance to Jugra river, a *red fixed* light is exhibited, which should be visible, in clear weather, for a distance of 6 miles. Lat. 2° 48′ N. Long. 101° 24½′ E.

Bukit Jugra, or Parcelar hill, on the left bank of the Jugra river at about 3 miles from the sea, is, when seen from the northward westward, of an oblong shape sloping at both ends, but from the southward it appears conical. It is 915 feet above high water, thickly wooded, isolated, and being the only hill near the sea coast, is easily recognised, and in clear weather may be seen from a considerable distance.

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Chart,794 [2,519]. Var. 1° 0′ E.

Langat village is about 6 miles from the sea by the Jugra branch, and Jugra village, about 2½ miles below it, is situated at the foot of Parcelar hill. The water is deep off Jugra village, and the granite face of Parcelar hill comes close down to the bank; there is a police station and a good landing-place. The district officer lives on the hill, and a palace of the Sultan of Selángor is on the eastern side of the hill, with a road leading to it from the landing.

Beacons.—The bar of the Jugra river is marked by one beacon; the Ayer Itam or western entrance is marked by beacons on the port hand on entering, as before stated.

Directions.—The entrance to Jugra river may be recognised by the light pillar and police station on its south entrance point, and by Parcelar hill, and the latter kept on a N.E. by N. bearing leads up to the bar beacon. The bar has a possible depth of 17 feet at high water, spring tides; but a depth of 14 feet only was found at that time by H.M.S. *Fly*, in 1882.

Within the bar the river is 200 yards wide, with depths of from 3 to 8 fathoms, as far as Parcelar hill, where several branches of the river unite, and where also there is anchorage. The tidal streams in the river are strong, and caution must be taken to avoid snags.

Lat. 2° 41′ N. Long. 101° 29½′ E.

COAST.—Parcelar point is situated about 9 miles south-eastward of Jugra river, and being round and similar to the adjacent coast is not easily distinguished; Kinsara village is a little eastward of the point. The shore mudbank extends off about 4 cables, with a depth of 14 fathoms close-to.

From Parcelar point to Sungi Sepang Besar, a distance of 15 miles, the whole of the coast is low, thickly wooded, and skirted by a sandbank which extends from a quarter to half a mile seaward; few villages or huts are visible, yet it is inhabited by fishermen who, apparently, live a short distance from the beach, for smoke may constantly be seen rising all along the coast.

Chart,796 [2,523]. Lat. 2° 35′ N. Long. 101° 43½′ E. Var. 0° 55′ E.

Sungi Sepang Besar is navigable for craft of 6 feet draught for a distance of 14 miles; the bar across its mouth has a depth of 5 feet at low water, but within the water deepens from 2 to 6 fathoms as far as Kankar, where there is a Chinese village.

Boundary.—The Sungi Sepang Besar is the boundary between Selángor and Negri Sembilan.

Sungi Lukut, 4½ miles eastward of Sungi Sepang Besar, may be entered at high water, spring tides, by vessels drawing 9 feet water; steam launches can ascend about 5 miles, as far as Raja Bot house; at the mouth of the river is a village.

Between Sungi Lukut and tanjong Kamuning is pulo Burong, a small isle skirted by rocks and surrounded by shallow water.

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Water.—There are two good fresh water streams in the bay on the east side of entrance of Sungi Lukut. Chart,796 [2,523]. Var. 0° 55′ E.

Off-lying shoals.—Bambek shoal, 3 miles from the coast, and situated nearly midway between Parcelar point and cape Rachado, dries near its centre, and is composed of hard sand. Within a depth of 3 fathoms, it is 2 miles in length, in a direction parallel to the coast, 7 cables in breadth, and mostly "steep-to," the water deepening suddenly to 8 or 10 fathoms within one cable. Between Bambek shoal and the coast is a small bank on which the depth is 3½ fathoms, with irregular soundings around it, and between this small bank and the coast there is a deep channel one mile wide. Lat. 2° 32½′ N. Long. 101° 40¼′ E.

Westward of the north-west extremity of Bambek shoal are detached banks of 7 and 10 fathoms, the western distant 6 miles from the dry patch.

Four miles eastward from the dry part of Bambek shoal, is a shoal, with 3 fathoms water over it, near the north-west extreme of a sandbank, from a half a mile to one mile wide, which extends nearly to cape Rachado; the bank is 10 miles in length between the 5-fathoms contour lines, has a dry patch nearly in the centre, and depths of from one fathom to 5 fathoms over the remainder. Between the bank and the shore there is a channel about half a mile wide, leading to Arang Arang anchorage.

Vessels should not bring cape Rachado lighthouse or its light to bear southward of S.E. by E. ⅜ E., to ensure passing southward of Bambek shoal, and the shoals inshore of it.

ARANG ARANG ANCHORAGE or Port Dickson. —Pulo Arang Arang, an island about 1½ cables in diameter, is situated about a quarter of a mile southward of tanjong Kamuning, and the space, about 1½ cables wide, between the reefs projecting from either side, is known as Arang Arang anchorage, or port Dickson. The approach directly from seaward (south-westward) is barred by a sandbank which has a depth of 25 feet at low water in the fairway over it. There is apparently deeper water along the shore to the north-westward, but this channel has not been examined. Plan, 1,143 [2,521]. Var. 0° 50′ E.

Pier.—The pier at Arang Arang settlement, on the south-east side of tanjong Kamuning, is 720 feet in length, 460 feet of which is masonry, the remainder of iron; it has a depth of 23 feet alongside at low water, over a length sufficient for two ordinary coasting steamers; an iron extension has a depth of 7 fathoms at its outer end. There is a large galvanized iron shed, with an arched roof, at the outer end of the masonry portion of the pier. The railway runs down on the pier, and vessels can discharge cargo into the railway trucks. Lat. 2° 31½′ N Long. 101° 47¼′ E.

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Chart, 1,143 [2,521].
Lat. 2° 31½′ N.
Long. 101° 47½′ E.
Var. 0° 50′ E.

LIGHTS.—An iron skeleton tower, 40 feet in height, painted white and situated near the centre of the pier, exhibits, at an elevation of 48 feet above high water, a *white occulting* light with a period of system of *fifteen seconds*, which should be visible, in clear weather, from a distance of 9 miles.

A *red fixed* light is exhibited, at an elevation of 30 feet above high water, from a wooden standard situated N. 57° E., distant 200 yards from the pier light, and should be visible, in clear weather, from a distance of 4 miles.

Shoals.—A coral patch with 6 feet least water over, and 7 to 9 fathoms around it, lies in the approach to Arang Arang, with the centre of pulo Arang Arang bearing N.E. by E. ⅓ E., distant 3¾ cables.

Tanjong Kamuning, and the coast eastward of it to the pier, is fronted by shallow water, the 5-fathoms contour line being one cable from the shore; shoal water extends for nearly half a cable round pulo Arang Arang, except to the eastward, in which direction there is a shallow bank.

Buoys.—A conical shaped buoy, painted white and surmounted by a staff and cage, is moored in 16 feet water on the north-west end of the bank, which extends 6 miles from cape Rachado.

A conical shaped buoy, painted red, is moored about two-thirds of a cable north-westward of the 6 feet coral patch.

Two conical shaped buoys, painted red, mark the shoal water south-eastward of pulo Arang Arang, and two similar buoys are moored south-westward of the pier.

The buoys should not be depended on.

Communication.—Regular steamship communication with Singapore, Malacca, port Swettenham, and Telok Anson; by rail with Seremban and Kajang, which latter will be connected with Kwala Lumpor; telegraphic communication with all parts.

Supplies.—Bread, in small quantities, may be obtained at Arang Arang; fresh meat and vegetables can be procured, by rail, from Seremban, and a few fowls and fish from the Malay fishermen; good water is obtainable. The jungle abounds with life—tigers, deer, pigs, monkeys, argus pheasants, and several sorts of pigeons, but it is so dense that little can be done with the gun.

Anchorage.—Arang Arang affords good anchorage in from 5 to 10 fathoms water during the north-east monsoon, and is said to be not unsafe in the south-west monsoon.

Directions.—Approaching Arang Arang, from either northward or southward, the large shed on the pier, already mentioned, is a conspicuous

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object. Cape Rachado lighthouse should be kept bearing southward of S.E. by E. ½ E., until the light beacons, or the lights at night, are in line bearing N. 59° E., and, these being steered for, will lead over the sandbank in about 25 feet at low water, and northward of the buoy marking the 6-feet patch to the anchorage. Charts, 1,113 [2,521]. Var. 0° 50′ E.

Tides.—It is high water, full and change, at Arang Arang, at 7h. approx.; springs rise 10 feet.

Tidal streams.—In the harbour, the flood stream sets to the eastward and the ebb to the westward; but seaward of the 5-fathoms bank, the streams set across the channel; the flood setting south-eastward from 3½ hours before until 2½ hours after high water by the shore, and the ebb north-westward.

Winds.—Sumatras blow home here in October and November. They seldom last more than a few hours, but they raise a little sea; it is, however, not considered dangerous to shipping.

CAPE RACHADO (TANJONG TUAN) is a steep bluff point, covered with trees and easily distinguished, as it is higher than the adjacent coast, and appears when first seen in the distance like an island. There is deep water a quarter of a mile distant. Chart, 796 [2,523].

From cape Rachado the low woody coast of Sumatra, distant 20 miles, may be seen, the strait being here more contracted than at any other part northward of Malacca.

LIGHT.—On cape Rachado, a cylindrical tower 78 feet in height and painted white, exhibits at an elevation of 388 feet above high water, a *white fixed* light visible in clear weather between the bearings of S. 55° E. and N. 55° W. from a distance of 26 miles. The limit of the light to the northward passes over the centre of Bambek shoal, and touches Parcelar point; and the limit of the light to the southward leads half a mile south-west of pulo Batu Besar or Diana rock. Lat. 2° 24½′ N. Long. 101° 51½′ E.

Water.—Near the cape there are two fresh water wells.

Tidal streams.—Off cape Rachado the flood sets S.E. by E., and the ebb N.W. by W. at rates of from 2 to 2½ knots; the south-eastern stream makes from 2 to 3 hours before high water at One-fathom bank and runs for 6 hours. (*See* p. 205.)

ISLANDS and DANGERS near the fairway.—AROA ISLANDS, a group lying nearly in mid channel between Sumatra coast and the North sands, spread over a space about 9 miles in extent; they are small and situated on a bank of from 6 to 10 fathoms, the northern end of which extends 6 miles north-westward of the islands; the southern Chart, 794 [2,519].

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Chart,794 [2,519]. Var. 0° 40′ E.

joins an extensive mudbank adjacent to the Sumatra shore. Aroa bank is "steep-to" on the north, east, and west sides, the depths suddenly increasing to 18 and 20 fathoms.

CAUTION.—Much care is requisite in approaching Aroa islands during the night, as many of them are low, and difficult to see after dark.

Lat. 2° 55′ N. Long. 100° 36′ E.

North rock, the northern islet is small, about 15 feet above high water, and surrounded by a reef.

Pulo Jemur (Long Aroa), lying nearly 3 miles south-west from North rock, is two-thirds of a mile in length, 400 yards in breadth, flat, and covered with trees, from 80 to 90 feet above high water. Two small islets nearly joined, and having a reef of rocks which extends three-quarters of a mile north-east of them, are situated 2 cables north-east of pulo Jemur.

Malay fishermen sometimes visit pulo Jemur to fish and procure turtle in the season, and there are some huts and a small spring of fresh water on the island, but not sufficiently large to water a vessel from. In and after the rainy season, or to about the end of the year, a quantity of water may be obtained, there being several natural tanks on the island, but these dry in the hot season; the best watering place is on the western side, which is clear.

Anchorage may be obtained close to the island in 6 or 8 fathoms water, over mud, with the highest part of the island bearing North.

Western Aroa, a group of islets from 85 to 90 feet above high water, three-quarters of a mile westward of Long Aroa, are five in number, namely, Tekong Mas, pulo Rendang, Pasir Panjang, Labuan Biti, and Tekong Chama, occupying a space of $1\frac{1}{2}$ miles; they are all connected by a reef nearly dry at low water, and extending half a mile N.N.W. of them.

Batu Balia, a group of six rocks 3 feet above high water, surrounded by a circular reef, is half a mile in diameter, and lies about 3 miles eastward of pulo Jemur.

A rock which dries at half ebb and is "steep-to," lies $1\frac{3}{4}$ miles eastward of Batu Balia.

Lat. 2° 52′ N. Long. 100° 41′ E.

Batu Mandi or East rock, 6 feet above high water, lies about 7 miles eastward of pulo Jemur, with depths of 16 to 18 fathoms within a short distance.

Tekong Simbang, or Round Aroa, is 95 feet above high water, precipitous, and the highest of the Aroa group; its summit is covered with trees and may be seen from a distance of 15 miles. There are several rocky islets around it. Tekong Simbang, with its outlying

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islets, occupy a space of 1¾ miles north and south, and three-quarters of a mile east and west; the southern islet, pulo Tekong, is 30 feet above high water. Chart.794 [2,519]. Var. 0° 40′ E.

Tides.—From observations extending over a few days in November 1893, during the north-east monsoon, it was found to be high water at the Aroa islands (Round island) at 6h. approximately; springs rising 14 feet, neaps 9 feet.

Tidal streams.—Off the islands, at springs, the flood stream sets south-east, at the rate of about 2 knots, making from 4 to 5 hours before high water by the shore, and running until one hour to 2 hours after. The ebb sets north-westward about 3 knots. At neaps, the south-east or flood stream being overcome by the prevailing north-west current, was not felt until about 3 hours before high water, ceasing about 2 hours after high water.

NORTH SANDS comprise various sandbanks and spits extending from the Malay coast between Selángor river and Parcelar hill towards the Aroa islands. The sandbanks have a general north-west and south-east direction, with depths of 6 to 20 fathoms water between them. The north-west extremity of the North sands is on the parallel, and 22 miles west of the Botel islands, situated 8 miles southward from Selángor; a narrow strip of sandbank, having depths varying from 7 fathoms to nearly dry, extends thence in a south-easterly direction a distance of 12 miles. Lat. 3° 13½′ N. Long. 100° 54½′ E.

Batu Kinching, the southern portion of the North sands, has a dry spot about one mile from its southern end. These banks and patches are usually discernible from a short distance during daylight.

Blenheim shoal, having 4 feet least water over it, is about 2 miles in length, lies 5 miles south-west of Batu Kinching, and about 10½ miles northward of One-fathom bank lighthouse. Lat. 3° 3½′ N. Long. 100° 57¼′ E.

Banks.—A bank, with 2½ fathoms water over it, lies between Blenheim shoal and Batu Kinching. At 8 miles eastward of Blenheim shoal is a bank 3 miles in length, with 7 feet least water. Five miles southward of Blenheim shoal, in the direction of One-fathom bank, is a patch of 3½ fathoms, and 3 miles south-east of this is a patch of the same depth. Between Blenheim shoal and the banks just mentioned, and the flat extending northward from pulo Klang, are other shallow banks, the position of which will be seen on the Admiralty charts.

ONE-FATHOM BANK, one mile in length, inside the 3-fathoms contour line, lies on the eastern side of the fairway of Malacca strait; north-eastward and south-westward of the bank the depths increase quickly to 10 and 13 fathoms, but north-westward the bank extends

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Chart,794 [2,519]. Var. 0° 55′ E.

8 miles, with depths of 4 to 8 fathoms, and south-eastward about 1½ miles.

A patch, with 3½ fathoms water over it, lies about 8 miles south-westward on the opposite side of the fairway, and another, with depths of from 8 to 8½ fathoms, over sand and shells, was reported (SS. *Pekin*, &c., 1895) N.W. by W. ½ W., distant 20 miles from the lighthouse.

Lat. 2° 53¼′ N. Long. 100° 59¾′ E.

LIGHT.—An iron screw-pile light tower, 60 feet in height, and painted in bands of red and slate colour, is situated near the eastern edge of One-fathom bank, and exhibits, at an elevation of 50 feet above high water, a *white revolving* light, with a period of revolution of *one minute*; it should be visible, in clear weather, from a distance of 13 miles.*

Fog signal.—A bell is sounded in thick or foggy weather.

Channels.—There is a deep channel between the bank which extends from pulo Klang and the eastern side of North Sands, but unless it were buoyed it would be dangerous for large vessels to use it, as no bearings can be given to direct them. Coasting vessels use this channel, keeping on the edge of pulo Klang bank in depths of from 4 to 5 fathoms.

The channel between the north-west extreme of North Sands and Aroa islands is deep; the deep water extending to within 5 miles of North rock of the Aroa islands, and close to East rock.

SOUTH SANDS are of similar formation to North Sands, and extend across with but little interruption to the Sumatra coast. The neighbourhood of South Sands may be considered for sailing vessels as the most dangerous part of Malacca strait, there being no near objects from which bearings can be given for vessels working through, to clear the dangers.

The eastern edge of South Sands forming the western side of the navigable channel through Malacca strait, and within the 5-fathoms contour line, extends about 40 miles in an east south-east direction, from a position 7 miles south of One-fathom bank; and north-eastward of tanjong Senebui, on the Malay coast, is distant 21 miles. The northernmost shallow head, of 2¾ fathoms, lies S. by E. ⅝ E., distant 11 miles, from One-fathom bank lighthouse.

Lat. 2° 42½′ N. Long. 101° 3¼′ E.

Chart,796 [2,523].

Pyramid shoal, the south-eastern extreme of the South Sands chain, is the most dangerous, standing out beyond the others a distance of

General chart, 1,355 [2,513].

* During the year 1900 (probably in the month of December) One-fathom bank light will be altered to a *white group flashing* light with a period of system of *fifteen seconds*, showing groups of four flashes as follows:—Flash, *one third of a second*; eclipse, *two seconds*; flash, *one third of a second*; eclipse, *two seconds*; flash, *one third of a second*; eclipse, *two seconds*; flash, *one third of a second*; eclipse, *seven and two thirds seconds*; it should then be visible, in clear weather, from a distance of 15 miles. Works are in progress for the erection of a new lighthouse, and flares or other lights, in connection therewith, may be occasionally shown at an elevation of 8 feet above high water.

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4 miles nearer the track of vessels. The shoal is about one mile in length, with one fathom least water, over a bottom of hard sand. Bambek shoal, the nearest danger on the other side of the fairway track, lies 11½ miles north-eastward from it; Rachado light bearing E. by S. ⅛ S. leads about 2 miles northward of Pyramid shoal.

Chart,796 [2,523].
Lat. 2° 26¾′ N.
Long. 101° 29¼′ E.
Var. 0° 55′ E.

Tides.—It is high water, full and change, at One-fathom bank at 6h. 15m., springs rise 14 feet, neaps 10 feet.

Tidal streams.—During springs the streams, within from 10 to 15 miles of One-fathom bank, are regular, the flood running about S.E. at rates of from 1½ to 1¾ knots, and the ebb N.W. from 2½ to 3 knots, turning very nearly with high and low water.

Near the northern and central parts of the South Sands the streams are tide and half tide; one stream setting S.E. by E., at the rate of 1¼ knots, from 3 hours before to 3 hours after high water; and the other stream N.W. about 2 knots for a similar period.

Near the southern part of South Sands they make one hour earlier, the velocities being about the same. There is an interval of slack water at times, but at others the stream continues running the whole time, gradually changing its direction. It rotates in either direction, possibly dependent on the wind.

Directions.—Vessels from the northward should make One-fathom bank lighthouse bearing about E.S.E., and steer to pass about 3 miles southward of it, then keep more to the eastward toward Parcelar point, passing it at the distance of 5 miles; maintaining this distance off shore will clear Bambek shoal, as will also Rachado lighthouse, bearing S.E. by E. ⅜ E.

Sailing vessels working to windward should not stand farther off the coast than 10 miles, nor nearer inshore than 3½ miles when between cape Rachado and Bambek shoal. The depths near the banks are so irregular that they afford no guide as to the proximity of those dangers.

At night.—Vessels should keep Rachado light bearing eastward of S.E. by E. ⅜ E., to avoid Bambek shoal.

LINGI RIVER is entered 7 miles to the eastward of cape Rachado, the coast between being fronted by a mudbank which extends off the bight westward of Bukit Salamat for a distance of 1¼ miles.

The river, the principal trade outlet for the protected state of Sungi Ujong, is navigable for vessels of 8 or 9 feet draught as far as Sempang, about 5 miles from the mouth, and for large boats for 4 or 5 miles beyond. At Sempang there is a police station, and another stands on the south point of the river; a tree (whitewashed) marks the north point.

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Chart,796 [2,523].
Var. 0° 55′ E.

Dangers.—A shoal, with 2½ fathoms water over it, lies with the south entrance point of the river bearing about E. ⅜ S., distant 2 miles.

Lat. 2° 22′ N.
Long. 101° 57½′ E.

Batu Mandi is a rock awash lying 1½ miles south-west of the entrance of Lingi river.

Batu Tenga are three rocks just above water, lying 2 miles east-south-east from Batu Mandi.

A rock, situated between the entrance points, covers when there is a depth of 10 feet on the bar.

Beacons.—Batu Mandi and the rock situated between the entrance points are each marked by a beacon.

Banks, with 12, 9, and 11 fathoms, lie south-westward of Batu Tenga, at distances of 2, 3, and 6 miles, respectively.

Anchorage.—There is good anchorage off the entrance in 9 fathoms water, over mud, with Rachado lighthouse bearing W. by N. ⅝ N., and Bukit Salamat N. ¾ E.

Directions.—The river should not be entered without a pilot, who may be procured at Malacca. The bar, with rocks on either side, has a depth of 12 feet at high water, spring tides, and from off the entrance the course is about N.E. by N., passing about 3 cables off the south-eastern point of the river, until the whitewashed tree bears E. by N., when it should be steered for until a conspicuous clump of trees is in line with the rock beacon in the entrance.

From this position a solitary hill will be seen over the river, which should be steered for, passing about 50 yards or less northward of the beacon rock, as the water shoals rapidly from 7 fathoms to 3 or 4 feet westward of the north point; thence there appears to be no difficulty in proceeding to within half a mile of Sempang, where there is anchorage in 4 fathoms water, with plenty of room to swing.

Boundary.—Lingi river forms the boundary between Negri Sembilan and Malacca.

Tides rise 9 feet at springs.

COAST.—From Lingi river the coast has a south-east direction for 15 miles to tanjong Kling, and consists mostly of irregular rocky points with occasional small sandy beaches.

Lat. 2° 16½′ N.
Long. 102° 4½′ E

Pulo Batu Besar (Diana rock), 10 feet above high water, and one mile from the shore, lies about 15 miles south-eastward from cape Rachado lighthouse, which light is obscured when within half a mile of the rock. Inshore of pulo Batu Besar there are several other rocks;

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a sandy ridge, with from 3½ to 5 fathoms water over it, lies between a half a mile and 2½ miles north-westward of the rock. Chart, 796 [2,523]. Var. 0° 55′ E.

A shoal head, with a depth of 2 feet over it, lies 1¼ miles south-eastward from pulo Batu Besar, and one mile off tanjong Panchur; several islets and a sunken rock also lie within half a mile of this point.

Tanjong Kling, the north-west boundary of Malacca bay, is a low projecting point of land covered with high jungle; there is a flagstaff on it.

Shoal.—A coral shoal of small extent, with a depth of 4 feet and "steep-to," lies with the flagstaff at tanjong Kling, bearing N. by E. ⅞ E., distant about 5 cables, and another shoal is said to lie north-westward of it. The point should be given a berth of at least one mile.

RALEIGH SHOAL, with 3½ fathoms least water over it, is about a mile in length in a north-west and south-east direction, and half a mile in breadth within the 5 fathoms contour line, and lies S. ¾ E., distant 17½ miles from cape Rachado lighthouse, and nearly 10 miles from the nearest part of the Sumatra shore. The shoal is "steep-to" on its north-east and south-west sides, but, in a north-west and south-east direction, there are depths under 10 fathoms for a distance of three-quarters of a mile, and a bank, on which there is from 12 to 15 fathoms water, extends about 6 miles in a north-west direction from that extreme of the shoal. Lat. 2° 7′ N. Long. 101° 53½′ E.

MALACCA.—The town of Malacca is built on both sides of the small river of that name, and connected by several bridges; it is the seat of Government of the British settlement of Malacca, and a free port.

On the left bank of the river is St. Paul's hill, surrounded by the remains of an old fort. On the summit of the hill stand the ruins of the ancient church of Our Lady del Monte, also the lighthouse and flagstaff. Around the base of the hill lie the high school, court house, church, hospitals, post office, harbour master's office, and other public buildings. The population is about 95,000.

A little to the south rises St. John's hill, and in the rear of it that of St. Francis; on these eminences are the remains of batteries erected by the Portuguese and Dutch; smaller knolls intervene covered with extensive Chinese cemeteries.

The country a few miles inland is formed of undulating hills, moderately elevated, named Malacca hills, and 20 miles E.N.E. of them is Gunong Ledang or mount Ophir, having a triple peak, 4,186 feet above high water; the coast and land adjacent to the town are low and wooded. Lat. 2° 22′ N. Long. 102° 36¼′ E.

A pier, 1,200 feet in length, extends off the east point of entrance to the river, with a depth of about 3 feet at low water at its extreme.

LIGHTS.—On the summit of St. Paul's hill, a square tower 90 feet in height, and painted white, exhibits at an elevation of 180 feet above high

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Chart,796 [2,523]. Lat. 2° 11¾′ N. Long. 102° 15′ E. Var. 0° 55′ E.

water a *white fixed* light, which should be visible, in clear weather, between the bearings of N. 45° W. and S. 45° E., and from a distance of 12 miles.

From the pier head at Malacca is exhibited, at an elevation of 15 feet above high water, a *fixed* light showing *red* to seaward and *white* inshore; it should be visible, in clear weather, from a distance of 7 miles.

Lloyds signal station.—There is a Lloyds signal station.

Communication.—There is weekly steamship communication with Arang Arang and Singapore, and regularly with the other ports of the Straits Settlements; a railway is in course of construction to Tampin in the State of Negri Sembilan, a distance of 21⅓ miles, where it joins the main line of the Federated Malay States; and telegraphic communication with all parts. There are good roads with rest-houses, where accommodation may be obtained by applying to the Superintendent of Works, Malacca. *See* Chapter I., page 6.

Supplies.—Fresh meat, bread, vegetables, poultry, fish, and a variety of fruits may be procured, and water on application to the harbour-master.

Repairs.—Large repairs to machinery can be effected; there are sheers which will lift 10 tons, and a 3-tons steam hammer, and two smaller ones. Vessels of 900 tons have been built.

Hospital.—There is a Government hospital for all classes.

Quarantine.—The station is on pulo Upeh and the anchorage on the southern side of that island.

Observation spot.—The Colonial trigonometrical station on St. Paul's hill, at the eastern end of the ruin, deduced by telegraph from Singapore, is in longitude 102° 15′ 0″ E.

Submarine telegraph cables.—Telegraph cables connect Malacca with Penang and Singapore.

Trade.—The chief exports comprise tin, rice, pepper, nutmegs, hides, rattans, &c.; the proportion is small compared with Penang. Once a great trade centre, the town has become, in a commercial sense, a mere suburb of Singapore, most of the produce being taken to that port for shipment.

Climate.—The town is fairly healthy; the temperature is a few degrees higher than Singapore.

Malacca river.—The entrance to Malacca river is nearly dry at low water, being obstructed by a bank of soft mud, which extends about one mile from the shore with 18 feet on its outer edge; the mouth has been recently dredged and it is proposed to construct a boat harbour. The channel over the bar is marked by stakes, and large lighters and junks can enter the river at about a quarter flood. The river is spanned by several bridges, connecting the town.

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Chart,796 [2,526].
Lat. 2° 11½′ N.
Long. 102° 12½′ E.
Var. 0° 55′ E.

MALACCA ROAD.—Islets.—Pulo Upeh, situated 2¾ miles westward of Malacca town, and 1¼ miles from the shore, is about a quarter of a mile in extent, and situated on the outer edge of the mudbank which skirts the shore; the islet is about 90 feet above high water, its top covered with trees and easily discerned. A patch, with 18 feet water over it, lies about half a mile southward of the east point of the islet.

At night, vessels should not approach this islet to a less depth than 15 fathoms.

Pulo Java, or Red island, composed of two islets nearly joined, is about 4 cables in extent, and lies three-quarters of a mile south-east of the river, and on the edge of the mudbank.

Beacon.—A stone beacon, painted red and surmounted by an iron cage, marks a small islet, which covers at high water, situated 2 cables seaward of pulo Java.

Pulo Panjang, a narrow rocky flat half a mile in extent and covered at high water, lies nearly one mile south-south-eastward from pulo Java, and about the same distance off shore; it is "steep-to" on its south side, but on the inner side the water is shallow.

Beacons.—Stone beacons, painted red and surmounted by iron cages, mark the east and west extremes of pulo Panjang; the western is small, indistinct, and covers at high water.

Anchorage.—Malacca road is included in the space lying seaward of a line joining pulo Upeh and pulo Panjang, and is a safe anchorage. The best berth is in about 10 to 12 fathoms water, with St. Paul's hill lighthouse bearing N.E. ⅛ N., and about 2 miles off shore, or with pulo Anyut and pulo Undan in line bearing S.E. ⅛ S. Under a depth of 10 fathoms the bottom is chiefly mud, but exceeding that depth it is a stiff clay; on the east side of the road the bottom is rocky. The 5-fathoms contour line is about 1½ miles off shore, beyond which the depths increase somewhat quickly to 8 and 10 fathoms.

Small vessels may lie closer in, with tanjong Kling just within pulo Upeh, bearing W.N.W., and St. Paul's hill lighthouse about N.E. The depth here is 2½ fathoms, over mud, at low water, spring tides.

The sea-worm in these waters is destructive to vessels or boats not having copper sheathing.

Directions.—In approaching Malacca road from seaward, the first objects seen are a cluster of trees crowning the summit of St. Francis hill, the lighthouse and ruined church on St. Paul's hill, and the white edifices which, skirting its base and extending along the seashore, are gradually lost in the thick groves of cocoa-nut trees which cover the dwellings of the Chinese and Malays. In the background rise the Malacca hills, and in the distance the triple peak of Gunong Ledang.

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Chart,706 [2,523]. Var. 0° 55′ E.

The road may be safely approached, as there is no sunken danger beyond the mud bank skirting the shore, except the 3-fathoms patch lying half a mile southward of pulo Upeh.

A good look-out should be kept for floating fish traps, which at high water sometimes lift their moorings, drift about the anchorage, and are liable to foul the propellers.

By night.—Vessels approaching from the southward at night will make pulo Undan light, and passing southward of it, and westward of pulo Anyut, will then bring those two islands in line astern, or the light bearing S.E., which will lead to the anchorage, with St. Paul's hill light bearing N.E. $\frac{1}{8}$ N., passing well clear southward of pulo Panjang. Pulo Undan light will also be seen when approaching the road from the northward.

Tides.—It is high water, full and change, in Malacca road at 7h. 30m.; springs rise 11 feet, neaps 8½ feet.

Tidal streams.—The tidal stream sets S.E. by E. at the rate of 2½ knots from 3 hours before to 3 hours after high water at One-fathom bank; for the remainder of the 12 hours it runs N.W. by W. about 1¾ knots.

Winds.—Malacca road is neither visited by the hurricanes of higher latitudes, nor is it within the influence of the monsoons of the adjacent seas; but during the period of the south-west monsoon sudden hard squalls frequently blow into the road from the Sumatra side in the night, accompanied with lightning, thunder, and rain. These winds, named "Sumatras," generally commence to blow at seven or eight in the evening, and attain their greatest strength at midnight. (*See* page 26.)

WATER ISLANDS consist of a group of six islands, of moderate height, round, and covered with trees, of which pulo Undan, the outer island, lies about 9¾ miles, S.S.E. ¾ E., from St. Paul's lighthouse, and 5½ miles from the shore. Pulo Besar, the largest, is about 250 feet above high water, and inshore of it the bottom is foul and rocky, but between the others there are depths of from 10 to 20 fathoms.

Lat. 2° 3¼′ N. Long. 102° 20′ E.

LIGHT.—On the summit of pulo Undan, an octagonal tower, painted red, and rising from the centre of a square two-storied white building, exhibits, at an elevation of 155 feet above high water, a *white group flashing* light with a period of system of *half a minute*, showing a flash of *two and a half seconds* duration, eclipse of *five seconds*, flash *two and a half seconds*, followed by an eclipse of *twenty seconds*; the light should be visible from a distance of 20 miles in clear weather.

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Dangers.—A shoal, with depths of from 2 to 3 fathoms over it, extends one mile north and north-west of pulo Besar, between that island and pulo Serimbun. The channel between pulo Dodol and pulo Besar has a rock, with 1½ fathoms water over it, about one-third of a mile northward of the former island. Chart,796 [2,523]. Var. 1° 0′ E.

Water.—On pulo Besar there are said to be several wells of good water.

ROB ROY BANK lies on the western side of the main channel through Malacca strait, and abreast the Water islands and within a depth of 6 fathoms, is about 7½ miles in length in a north-west and south-east direction. The shoalest spot near the south-east end has a depth of one fathom over it, and lies with pulo Undan lighthouse bearing N.E. by E. ¼ E., distant 17½ miles. Chart,795 [2,522]. Lat. 1° 54½′ N. Long. 102° 5′ E.

Shoal heads, with from 1½ to 4¾ fathoms water over them, extend thence about 3½ miles in a north-westerly direction, deepening to 5 and 5½ fathoms for a further distance of 2 miles, and then to 12 and 14 fathoms. On the north and south sides the bank is nearly "steep-to."

A shoal head of 4½ fathoms lies S.E. by E., ¾ E. distant 8½ miles, from the One-fathom patch on Rob Roy bank. This head is the centre of a narrow ridge 6 miles in length, having depths of from 5 to 8 fathoms, which ridge continues about 11 miles farther to the south-eastward, with depths of 8 to 15 fathoms.

COAST.—Between the town of Malacca and tanjong Segenting, near mount Formosa, a distance of 45 miles, the coast trends south-eastward, forming two bays; it is low, thickly wooded, and skirted by a mud bank which extends in some places 2½ miles off, and in the bight between Water islands and Muar river to 4 miles from the shore.

Boundary.—The Sungi Kesang is the boundary between Malacca and Johor. Lat. 2° 5½′ N. Long. 102° 29½′ E.

Muar river enters the strait at about 15 miles eastward of Water islands; its entrance is narrow, and on account of the shallow flat which extends off its mouth, is only navigable by small vessels. The bar is said to have a low water depth of 4 feet over it, but within it is wider and deeper. Lat. 2° 3½′ N. Long. 102° 33′ E.

Muar river is the longest in Johor province, and one of its tributaries, the Jempole, is separated from the Serting river by a strip of swampy land only 450 yards wide. It is therefore easy to drag canoes from one to the other, and as the Serting is a tributary of the Bera which joins the Great Pahang river, canoes can make the passage from Malacca strait to the China sea.

General chart, 1,355 [2,513].

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Chart,795 [2,522]. Var. 1° 5′ E.

The banks of the river are thickly settled by Chinese gambier and pepper cultivators as far as Bukit Kepong, a large village 60 miles up stream.

LIGHT BUOY.—A light buoy, exhibiting a *white fixed* light, is moored about 1½ miles north-west of the entrance to the river.

Town.—Bandar Maharani, the headquarters of the State Commissioner, and situated on the east side of entrance to the Muar river, is the second in importance in Johor province; it is about 2 miles in length by a quarter of a mile deep, has a considerable trade, and is plentifully supplied with good water brought in pipes from a reservoir about 12 miles distant. The population is about 5,000.

The country district extending south-eastward towards Bukit Muar, and known as Padang, is a flat alluvial plain about 30 miles in length and 10 in breadth, covered with areca-nut palm (betel nut) and cocoa-nut plantations.

Communication.—There is a constant steamship communication with Singapore and Malacca, and small steam launches, drawing 5 feet water, carrying passengers and cargo, ascend the river to Bukit Kepong; the district possesses good roads.

A light railway connects the town with Padang (Parit Jawa), about 8 miles south-eastward, and the centre of a very fertile agricultural district.

Trade.—Areca and cocoa-nuts are exported from Padang, and pepper, gambier, sago, and tapioca from the river districts; tin mining is carried on in the neighbourhood of Bukit Muar, and a gold mine is being worked near Gudong Ledang.

Lat. 1° 58¾′ N. Long. 102° 41′ E.

Bukit Muar, an isolated thickly wooded hill, about 900 feet above high water, situated 5 miles south-eastward of the river entrance, is visible from Malacca road in clear weather.

Tanjong Tohor, a low projecting point of land covered with jungle, is 14 miles south-eastward from Muar river, and a useful mark for clearing Formosa bank.

SUNGI BATU PAHAT (Formosa river) is fronted by a shallow flat, extending 3 miles off, with only a depth of one foot at low water near the entrance. Within the entrance there is deeper water, and it is probably navigable for light draught vessels or boats for many miles; at 6 miles up it bifurcates, the western branch being named Sempang Kiri, and eastern Sempang Kanan.

The eastern branch takes its rise in a swamp, close to the source of the Sungi Sembrong Endau, which discharges into the China sea. The

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town of Pengkalan is on this branch about 14 miles from the sea. The Chinese gambier and pepper cultivators are settled in large numbers on these streams. Chart,795 [2,522]. Var. 1° 5′ E.

Tides.—It is high water, full and change, at Kwala Sungi Batu Pahat, at 8h. 30m.; springs rise 11 feet, neaps 8½ feet.

Gunong Batu Pahat (Mount Formosa), 1,560 feet above high water, is the summit of a range of undulating hills, which terminate at tanjong Segenting. Pulo Sheilo is the small island about a cable from the coast, westward of tanjong Segenting. Lat. 1° 48½′ N. Long. 102° 58½′ E.

Formosa bank, off Sungi Batu Pahat, is, within the 5-fathoms contour line, 7½ miles in length in a north-west and south-east direction, 3 cables in breadth, with depths of from 2 to 4½ fathoms, over hard black sand.* The east end of the shallow part of the bank (3½ fathoms) lies with Gunong Batu Pahat bearing N.E. ¾ E., and distant 4 miles from tanjong Segenting; a ridge with depths of from 5 to 9 fathoms extends 6½ miles north-west of the west extreme of the shallow portion.

COAST.—From Gunong Batu Pahat to tanjong Bulus, a distance of 47 miles, the coast is low and thickly wooded, and abreast pulo Pisang forms a bight 3 miles deep; it is fronted by a shallow mudbank to distances of from one mile to 2 miles, except between pulo Pisang and pulo Kokob, where it extends nearly 6 miles from the coast. Several creeks empty themselves into the sea in this tract of coast. Within a line joining tanjong Segenting and pulo Pisang, the bottom is uneven, there being patches of 3½ and 4 fathoms, with 6 to 8 fathoms close-to; vessels therefore should keep seaward of the line.

Tides.—It is high water, full and change, from 8h. 30m. off Gunong Batu Pahat, to 9h. 30m. off tanjong Bulus; springs rise 10 to 11 feet, neaps 7 to 8 feet.

Tidal streams.—The south-eastern stream runs from 2 to 3 hours before high water to 2 or 3 hours after high water.

PULO PISANG, one mile in length, in an east-north-east and west-south-west direction, and covered with trees, is 7 miles from the coast, and 19 miles north-westward of tanjong Bulus; it may be seen from a considerable distance in clear weather.

A spit about half a mile wide, "steep-to," and with 3 feet water near its extreme, extends 5 miles in a S.E. by S. direction from pulo Pisang,

General chart, 1,355 [2,513].

* Borings were made on Formosa bank with the object of finding a site for a lighthouse, but under a layer of 4 feet of sand soft mud was found for a further depth of 20 feet.

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Chart,705 [2,522]. Var. 1° 5′ E.

and a bank having depths of 3 to 4 fathoms over it extends 5 miles north-west of the island.

Lat. 1° 28½′ N. Long. 103° 15½′ E.

LIGHT.—From a cylindrical lighthouse, 40 feet in height, built of red brick, and with a white lantern, erected on the summit of pulo Pisang, is exhibited at an elevation of 510 feet above high water, a *white flashing* light with a period of system of *five seconds*, which should be visible, in clear weather, from a distance of 30 miles. The light is visible over pulo Kokob.

FAIR CHANNEL BANK, a long and narrow bank stretching nearly the whole distance between Formosa bank and pulo Pisang, is "steep-to," and has general depths of from 9 to 12 fathoms; a patch of $4\frac{3}{4}$ and another of 5 fathoms lie 5 and 7 miles respectively from its south extreme, the former with pulo Pisang lighthouse bearing E. $\frac{1}{8}$ N. distant 7 miles.

Long bank, on the southern side of the fairway is of a similar character but shallower, and lies parallel to Fair channel bank.

The western extreme of the shallow portion, which has depths of from $2\frac{3}{4}$ to 5 fathoms over a distance about 22 miles, lies nearly 16 miles, S. $\frac{7}{8}$ W., of tanjong Segenting. It is "steep-to" on its north and south sides.

Westward of Long bank are numerous similar banks extending to within a short distance of the banks fringing the Sumatra side of the strait. It would be perplexing to the seaman to give any further description of these banks; the best idea of them is to be gained by studying the Admiralty chart.

Pulo Kokob is a low flat wooded island 2 miles in length and $1\frac{1}{2}$ miles in breadth, lying within the edge of the coast bank at 6 miles westward of tanjong Bulus, and separated from the coast by a narrow passage. The trees on the north-west side are of a bright green colour, and at the south-east end they are tall erect poon trees, like those on the adjoining coast.

Lat. 1° 16½′ N. Long. 130° 30½′ E.

Tanjong Bulus, the south point of the Malay peninsula, is a broad tongue of low land having high trees on its western side and low bright green mangroves to the eastward. All the adjacent country is low with the exception of Gunong Pulai, an isolated mountain, 2,220 feet above high water, situated 20 miles northward of the point.

The mud bank, drying at low water to the distance of one mile south of the east part of the point, is fairly "steep-to."

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Tides.—It is high water, full and change, at tanjong Bulus at 9h. 30m. Chart,795 [2,522]. Var. 1° 5′ E.

Tidal streams.—The east-going stream runs from 2 to 3 hours before, to 2 to 3 hours after, high water.

CAUTION.—In passing tanjong Bulus and pulo Kokob, caution must be exercised, as the east-going stream sets strongly towards the bank, and the west-going stream towards Long bank. (*See* Tides, page 213.)

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CHAPTER IV.

SINGAPORE STRAIT.

Chart, 2,403 [2,525] Var. 1° 5′ E.

GENERAL DESCRIPTION.—Singapore strait is bounded on the north by the Malay peninsula and Singapore island, and on the south by the Bulang archipelago, and pulo Batam and pulo Bintang, two large islands. The entire length of the strait is about 60 miles, and its breadth, at the western entrance, about 10 miles, and at the eastern entrance about 20 miles, but southward of Singapore, between St. John islands and Batu Berantı, it is only 2½ miles wide.

Owing to the many sunken dangers in Singapore strait, its navigation was formerly attended with much difficulty and anxiety, but such has ceased to be the case since the erection of Raffles lighthouse upon Coney island, Horsburgh lighthouse on Pedra Branca rock, Sultan shoal lighthouse, and other lights and beacons. With common attention the strait can now be navigated either by day or by night.

For the sake of convenient reference it has been considered desirable, in describing this strait, to divide it into four portions, viz., Singapore strait, western part; Keppel harbour, Singapore town and road; Singapore strait, eastern part; and Old strait of Singapore.

SINGAPORE STRAIT.—WESTERN PART.

Chart, 2,404 [2,526]. Lat. 1° 9′ N. Long. 103° 40½′ E.

SOUTH SHORE.—Tree island (Pulo Angup), the north-western of a group of islands about 5 miles in extent, in a north-west and south-east direction, forming the southern side of Singapore main strait, is half a mile in length, and formed of rocks and sand, very little elevated above high water; there is a single tree on it. In 1902 there was a fisherman's hut on the island.

In passing northward of Tree island, Raffles lighthouse should not be brought to bear to the northward of East, which will lead half a mile northward of the reef, which extends three-quarters of a mile north-west of that island.

Kent rocks, between Tree and Red island reefs, lie in a north-west and south-east direction from each other, about 4 cables apart, "steep-to," and their positions are usually marked by tidal rips. From the southern rock, which is the larger of the two, and has a depth of 1¼ fathoms over it, the centre of Red island is in line with the east extreme of Long island, bearing S.E. $\frac{7}{8}$ E., the former island distant $1\frac{4}{10}$ miles. The northern rock is about 15 feet in length, with 4 feet water over it, and in 1902 was marked by some old fishing stakes.

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Red islet, or (pulo Palampong), a rock 20 feet above high water, is remarkable on account of its red-coloured strand, and lies $2\frac{2}{3}$ miles eastward of Tree island. The reef which surrounds Red islet extends about 4 cables off the north-west side of it. Chart, 2,404 [2,526]. Lat. 1° 7¼′ N. Long. 103° 42½′ E. Var. 1° 5′ E.

Two detached reefs lie in a south-westerly direction from Red islet, the outer and larger being distant about $1\frac{1}{4}$ miles.

Long island (Tekong Besar), 115 feet above high water, and lying three-quarters of a mile south-east of Red islet, is similarly surrounded by reefs, with a rock above water off its north end.

Round island (Tekong Kechil), small, thickly overgrown, and 132 feet above high water, lies half a mile south-east of Long island, and is surrounded by a reef to the distance of a quarter of a mile.

Long island and Round island are also known as the Brothers, both being covered with trees.

Phillip channel lies between Long and Round islands to the north-westward, and the numerous islands fronting Batam and Bulang islands to the south-eastward. It is free from danger, with good anchorage, and is a short route for vessels proceeding to or from Singapore, through Durian strait. Steep cape, the north-west point of Kepala Jeri island, is 224 feet above high water, precipitous and remarkable; it forms the south-east side of the channel. Lat. 1° 2¼′ N. Long. 103° 45¼′ E

Cap island, in the southern approach to Phillip channel, $3\frac{3}{4}$ miles southward of Round island, is a bare rock of a yellowish colour 40 feet above high water, with a flat top and perpendicular sides; it is surrounded by a reef to the distance of about $1\frac{1}{2}$ cables, with depths of 4 to 5 fathoms at 3 cables off the island.

Mid-channel reef, situated nearly midway between Cap island and Steep cape, is 6 cables in length in a north and south direction, $1\frac{1}{2}$ cables in breadth, with a depth of 12 fathoms between it and Cap island, and from 6 to 13 fathoms between it and Steep cape.

Coast.—That part of the southern side of Singapore strait between Phillip channel, and the Sambu islands situated a distance of 8 miles to the north-eastward, is formed of numerous islands lying on each side of the entrance of Bulan strait (Salat Batu Haji), which separates the islands of the Bulan archipelago from pulo Batam.

The north-west coast of pulo Batam comprises the islands and coast extending from the entrance of Bulan strait in a north-east direction to tanjong Pingi, a distance of 3 miles.

BULAN ARCHIPELAGO.—Islands and dangers. (*See* also page 660.)—The following islands and dangers border the Main strait:—

Ganymede, the largest of the western islands, is about 2 miles in length and fully half a mile in breadth, and composed of a number of

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Chart, 2,404 [2,526]. Var. 1° 5′ E.

moderately elevated hills, the greatest elevation being about 180 feet above high water. Several rocks above water lie on the reef which encircles the island.

Little Ganymedes, two small islands situated half a mile westward of Ganymede, are connected with it by a reef which also extends 3 cables westward of them.

Lat. 1° 7¾′ N. Long. 103° 46¾′ E.

Helen Mar reef, awash at low water, and "steep-to," is the outermost of the reefs which lie off the north-west end of pulo Bulan. It lies with Raffles lighthouse seen just within the left extreme of Alligator island bearing N.W. $\frac{1}{8}$ N., the lighthouse distant $2\frac{8}{10}$ miles.

Gunong Jantan, the south peak of Great Karímon, in line with Red islet, bearing W. $\frac{5}{8}$ S., leads about half a mile northward of Helen Mar reef; and Steep cape bearing S. $\frac{2}{3}$ W., leads half a mile westward of it.

Two coral ledges dry at low water and "steep-to," lie midway between Ganymede island and Helen Mar reef, and East, distant rather more than a mile from the latter, there is a shoal of hard ground with 2 fathoms water over it.

Lat. 1° 9¾′ N. Long. 103° 49′ E.

Buffalo rock, or Token, 5 feet above high water, lying well out towards the fairway of the strait, is about 30 feet in length, with depths of from 12 to 14 fathoms within a short distance. It lies with Raffles lighthouse bearing W. $\frac{1}{8}$ N., distant $4\frac{1}{4}$ miles.

Barren islet, the outermost islet on the western side of the entrance to Bulan strait, is a mere rock, and lies S.E. by E., distant $1\frac{2}{10}$ miles from Buffalo rock, and within the 10-fathoms contour line.

Islets, reefs.—Within and southward of Barren islet, are pulo Nérup (having a flat hill 158 feet above high water, in the middle of which is a conspicuous little tree), pulo Lajang (High island) (233 feet above high water), pulo Pinang (Saddle island), and many others, for which *see* the Admiralty chart.

BULAN STRAIT (Salat Batu Haji), or Strait of the Pilgrim rock, separating the Bulan archipelago from pulo Batam, is said to afford a safe and short passage into Rhio and Berhala straits, but it has not been properly surveyed, and, from the intricate nature of its navigation, it seems improbable that it will ever come into general use.

The safest approaches to it, from the northward, appear to be either between the Sambu islands and pulo Blakang Padang, taking care to keep over towards Mariám or Rabbit island, to avoid the coral spit which projects about half a mile eastward of pulo Blakang Padang; or entering from Batam bay, to pass Mariám island at a short distance, and bringing it to bear N. by E. astern, steer to the westward of tanjong Unchuk, passing about midway through the channel separating the groups of islands southward of Blakang Padang, from the Batam coast and the islands fronting it.

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Tanjong Pingi, or Batam point, on the eastern side of the entrance to the strait, has on it a high, pointed, and bare hill. (*See* also page 663.) Chart, 2,404 [2,526]. Var. 1° 5′ E.

Pulo Blakang Padang, the largest of the islands fronting the entrance to Bulan strait, is generally low, covered with jungle, about 1½ miles in diameter, and encircled by a reef, which projects nearly half a mile in places; it lies south-westward of the Sambu islands, and is separated from them by a channel half a mile in breadth, in which the depths are from 8 to 15 fathoms. Lat. 1° 8¼′ N. Long. 103° 55′ E.

Pulo Telup and pulo Senáng lie about half a mile off the west coast of pulo Blakang Padang, encircled by the same reef.

Two small patches, awash at low water, with a depth of 7 fathoms close-to, lie about half a mile off the west side of pulo Telup.

Beacon.—An iron screw-pile beacon, surmounted by a white ball, marks the coast reef, northward of pulo Blakang Padang, with the eastern point of the island, northward of Blakang Padang, bearing S. ⅝ E., distant 4½ cables.

Buoy.—A conical buoy, painted white is moored in 4½ fathoms water eastward of pulo Blakang Padang and 2¾ cables, S.W. by W. ½ W. from the south point of Miriám island.

Mariám or Rabbit island is an islet 2 cables southward of pulo Sambu. In the fairway between Mariám island and tanjong Pingi are three patches dry at low water, and some foul ground. Lat. 1° 9½′ N. Long. 103° 54½′ E.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, is moored 4 cables, S.E. by E. ⅔ E., from the north point of the island, the north-east side of which is in line with the north point of the island northward of pulo Blakang Padang.

Pulo Sambu, 207 feet above high water, and the larger of two islands which form the western limit of Batam bay, is nearly a mile in length, a quarter of a mile in breadth, and fringed by reef.

The island is used for storing petroleum brought from Borneo, and one of the tanks, round and painted white, is conspicuous from the northward, and may be seen from Singapore road; it is situated one-third of the length of the island from its north-west point.

Jetties.—There are two jetties on the south-west side of pulo Sambu for discharging petroleum; the northern has a depth of 30 feet, and the southern a depth of 26 feet alongside at low water, spring tides.

Water is plentiful on pulo Blakang Padang and pulo Sambu; a reservoir has been built on the latter to supply the oil works.

Little Sambu island and ledge.—Little Sambu island, about 3 cables in length, lies about a quarter of a mile north-north-westward of Lat. 1° 10½′ N. Long. 103° 53½′ E.

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Chart, 2,404 [2,526]. Var. 1° 5′ E.

pulo Sambu, and is fringed with coral, extending from the north-west point about 3 cables; this part is known as Sambu ledge, and has a rock above water near the middle. From this rock a shoal, with 6 feet water at its extreme, extends a third of a mile in a northerly direction.

Lat. 1° 11¾′ N. Long. 103° 33½′ E.

Batu Beranti, a rocky ledge, about 1½ cables in extent, the centre of which is above water, lies 6 cables N. by W. ⅛ W. from Little Sambu. Another and similar ledge lies a third of a mile westward of it.

The depths near these dangers are irregular, and afford no reliable guide for a vessel approaching them; close to are depths of from 7 to 20 fathoms.

Chart, 2,403 [2,525].

LIGHT BUOY.—A buoy, painted white, and exhibiting an *white occulting* light with a period of system of *twenty seconds*, is moored N.W. by W. ¾ W., distant about 4 cables from Batu Beranti; it shows light for *ten seconds*, and is eclipsed for *ten seconds*.

Eddies and overfalls.—Owing to the strong tidal streams which prevail in this part of the strait, and the rocky and uneven nature of the bottom, violent eddies and overfalls are usually to be met with, more especially towards the Sambu islands; it is therefore advisable to keep on the north side, near St. John islands.

Chart, 2,404 [2,526].

NORTH SHORE.—Between tanjong Bulus and tanjong Gul (the south-west extreme of Singapore island), a distance of 9 miles, lies the west entrance of the Old strait or Salat Tebrau, fronted by a shallow bank which extends from tanjong Bulus, and terminates in a prong half a mile to the southward of tanjong Gul. (*See* page 267.)

Anchorage.—During the north-east monsoon good anchorage may be obtained about three-quarters of a mile south of this bank in from 9 to 10 fathoms water, with tanjong Bulus bearing West, distant 3 miles.

Lat. 1° 14½′ N. Long. 103° 39½′ E.

SULTAN SHOAL, or Trumbu Karimon, situated on the north side of west entrance to Salat Sinki, is circular, about two-thirds of a cable in diameter, with rocks which dry about 2 feet at low-water, spring tides. Close to the westward of the shoal are depths of 3 and 4 fathoms, but the east side of the shoal is "steep-to," there being 6 fathoms near the rocks.

LIGHT.—A light-tower, above a two-storied dwelling, stands on Sultan shoal, and exhibits, at an elevation of 60 feet above high water, a *white flashing* light, with a period of system of *thirty seconds*, which should be visible, in clear weather, from a distance of 13 miles.

Ajax shoal, situated S.E. by E., distant one mile from Sultan shoal, is one cable in extent and composed of coral with sharp pinnacles, and has a depth of 3 fathoms over it. The water deepens gradually north-westward of the rock; but the south and west sides are "steep-to."

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Buoy.—A conical-shaped buoy, painted red, and surmounted by a ball, marks the south-west side of the shoal. Chart, 2,404 [2,526]. Var. 1° 10′ E.

SALAT SINKI, the deep water channel by which Keppel harbour of Singapore is approached from the westward, is bounded on either side by reefs; the length of the channel, to Cyrene shoal, is 4 miles, and, at its eastern and narrowest part, southward of that shoal, its breadth is 6 cables, with irregular depths throughout of from 9 to 16 fathoms. Cyrene shoal is situated about 3 miles to the westward of the entrance to Keppel harbour.

The channel in Keppel harbour, southward of pulo Brani, is also known as Salat Sinki. *See* page 238.

Beacons, painted white, mark the edges of the reefs on the north and painted red on the south side of Salat Sinki; the red beacons are said to be easily distinguishable by moonlight, when the white beacons cannot be seen. All the beacons have basket topmarks.

Pulo Sablu, a small islet 36 feet above high water, lies on the south-east side of entrance to Salat Sinki. A coral reef extends nearly half a mile eastward of it, but the channel side is nearly "steep-to." Lat. 1° 13′ N. Long. 103° 42¾′ E.

North side.—Pulo Sekra Laut, 76 feet above high water and half a mile in extent, has a small island close to the eastward of it. These two islands are the southernmost of an extensive group of islands lying close together, to the northward of which is a navigable channel named Salat Sembulan. Pulo Ayer Chawan, 84 feet above high water, lies northward of pulo Sekra Laut.

Reefs.—A reef awash at low water and surrounded by depths of from 4 to 5 fathoms, lies one mile westward, and another about 5 cables southward of pulo Sekra Laut.

Cyrene shoal, forming the north-eastern limit of Salat Sinki, and the first danger westward of Keppel harbour, is nearly a mile in diameter and irregularly shaped; on the northern part is a sand patch, having upon it a spot of coral, which is barely covered at high water.

Beacons.—The north side of the Salat Sinki is marked as follows:—A stone beacon painted white, on the reef southward of pulo Sekra Laut. A stone beacon, painted white with black bands, on the south-western point of Cyrene shoal. This beacon has on it a white board with "Harbour Limit" lettered in black on it.

LIGHT BUOY.—A buoy, painted red, and exhibiting a *white occulting* light, is moored off the south-eastern point of Cyrene shoal, with the preceding beacon bearing W. ⅛ S. distant about 5 cables. Lat. 1° 15¼′ N. Long. 103° 46′ E.

South side of the Channel.—Pulo Sablu, on the southern side of the entrance, has been already described. About 2¼ miles east-

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Chart, 2,404 [2,526]. Var. 1° 10′ E.

north-eastward of it is pulo Bosing, about 3 cables in length, and with a reef extending nearly 1½ miles westward of it. Freshwater island, about 6 cables eastward of pulo Bosing, is fringed, on its north side, by a reef extending about 1½ cables.

Beacons.—On the south side of the channel three stone beacons, painted red, mark the northern edge of the reef extending from pulo Bosing.

A stone beacon, painted red, marks the edge of the reef off the north end of Freshwater island.

Two beacons also mark a sunken rock lying 3 cables north-eastward of the centre of Freshwater island.

Directions.—Coming from the westward, and intending to proceed through Salat Sinki into Keppel harbour, a course may be steered to pass on either side of Sultan and Ajax shoals, but the track recommended for vessels of heavy draught is southward of those dangers; thence steer in mid-channel between the red beacons marking the reefs on the starboard hand and the white beacons on the port hand, to the entrance to Keppel harbour. (*See* page 241 for the directions for entering Keppel harbour from the westward.)

As the mail steam vessels, both to and from Europe, now pass through Salat Sinki, great attention is paid to the beacons which mark it.

At night.—Raffles light, well in sight and bearing S.E. by E. ¼ E., leads southward of Sultan and Ajax shoals.

Lat. 1° 17¼′ N. Long. 103° 40½′ E.

Salat Sembulan is a navigable channel half a mile in breadth between the reefs fringing the south shore of Singapore island, and pulo Pisi and pulo Ayer Limau.

Beacons.—On the north side of Salat Sembulan a stone beacon, painted white, and surmounted by a basket, marks a reef situated 9 cables eastward of tanjong Gul, and 4 cables off shore; and on the south side a stone beacon, painted red, and surmounted by a basket, marks the south-west end of the reef extending from pulo Pisi. An isolated patch lies about 1½ cables south-west of this beacon.

ISLANDS AND DANGERS.—A group of islands, about 5 miles in extent, lies to the southward of Salat Sinki, and to the westward of St. John and Blakang Mati islands, from which the group is separated by a navigable channel about 2½ miles in breadth with some islets and rocks in it. The islands are separated by deep channels, which, however, are so encumbered with reefs as to render them unavailable for anything but small craft.

Freshwater island (pulo Bukum) and pulo Bosing, are the northern islands of the group.

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Communication.—Freshwater island is in telephonic communication with Singapore Exchange. Chart, 2,404 [2,526]. Var. 1° 10′ E.

Liquid fuel.—A large stock of liquid fuel is kept in store and is delivered through a 6-inch pipe capable of discharging 300 tons per hour. About 2,500 tons of Japanese coal is also stocked.

Jetty.—On the east side of the south point of Freshwater island there is a jetty 700 feet in length, with a depth of 33 feet alongside its southern end for about 400 feet, shoaling gradually to 28 feet at its northern end, and a vessel alongside would have a depth of 8 fathoms on the off side; the jetty is easy of approach.

Beacons.—A sunken rock lying 3 cables north-eastward of the centre of Freshwater island is marked at its north-west and south-east extremes by a beacon surmounted by a staff and cage.

A coral reef half a cable in length, with a least depth of 2 feet, and "steep-to," situated about half a cable off the jetty end, is similarly marked at each extreme.

Buoy.—A buoy, painted red and black in checks, is moored in 5 fathoms water, to mark a pinnacle rock, with a depth of 20 feet over it, which lies nearly 4 cables northward of the jetty.

The beacons and buoy have been placed by the Oil Company owning tanks on the island, with the object of facilitating the access of the tank steamers to the Company's wharf.

Pulo Sudong, nearly 1¼ miles eastward of pulo Sablu, stands on the eastern part of a coral reef, the western edge of which is one mile distant from it. Lat. 1° 12½′ N. Long. 103° 44′ E.

Alligator island (pulo Rengkam), about one mile in extent, and 142 feet above high water, lies about three-quarters of a mile southward of pulo Sudong; the space between the reefs encompassing it and Barn island afford no safe passage for vessels.

Bank.—Westward of Alligator island is a bank about 4 miles in length, in a north-west and south-east direction, within the depth of 10 fathoms, with a patch of 5½ fathoms, the least known depth, at about one mile south-west of Alligator island.

Barn island (pulo Senáng), half a mile south-east of Alligator island, is about one mile in extent, 103 feet above high water, of a level aspect, and covered with trees. It is fringed with a reef, which extends a quarter of a mile from its east side, but barely 2 cables from its south-west side, near which are depths of from 9 to 10 fathoms.

Rabbit and Coney islets are small and nearly connected with the south-east end of Barn island by a reef of rocks partly dry at low

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Chart, 2,404 [2,526].
Lat. 1° 9¼′ N.
Long. 103° 44½′ E.
Var. 1° 10′ E.

water. A rocky spit, covered at high water, projects one cable southward from Coney islet, the southern of the group.

The depths southward of Coney islet, though irregular, are deep, there being 20 fathoms a short distance off the spit.

RAFFLES LIGHT.—On Coney islet, a lighthouse, 91 feet in height and painted white, exhibits, at an elevation of 105 feet above high water, a *white group flashing* light showing groups of *three flashes* in quick succession, *every ten* seconds, which should be visible from a distance of 16 miles in clear weather, between the bearings of S. 56° E., through east, to S. 66° W. The light, bearing westward of W.S.W., leads southward of all dangers off the northern shore.

Tides.—It is high water, full and change, at Coney islet at 11h. 0m.

Mangrove island (pulo Simakau) and reefs.—Mangrove island, about one mile in extent, lies near the centre of the group situated north-eastward of Raffles lighthouse; between it and Middle island is pulo Siking, 108 feet above high water, and surrounded by a reef.

Southward of Mangrove island are several small coral patches, all northward of a line joining Raffles lighthouse and Middle island. The south-easternmost patch dries at low water.

Middle island (pulo Sebarok), the eastern island of the group, is half a mile in length, 39 feet above high water, and surrounded by a reef which projects from the south-east point for a distance of nearly half a mile.

Rock.—Clearing mark.—A small ledge of rock barely dry at spring tides, and "steep-to," lies S.E. by E. ½ E., distant 6 cables from the south-east point of Middle island.

Pulo Jong (a small round islet 72 feet above high water, lying half a mile north-west of Middle island) open eastward of Middle island, bearing N.W. by W., leads north-east of the rock, and the high peak of Great Karímon in line with, or seen over, the north part of Barn island, W. by S. ½ S., leads southward of this danger.

The Sisters are small islets about 6 cables westward of St. John's island; pulo Subur Besar, the southern islet, is 68 feet, and Subur Kechil, the northern, 78 feet above high water. They are surrounded by reefs to the distance of one cable, and close to their edges are irregular depths of 5 to 9 fathoms. The channel between them and St. John's island is free from danger, with depths of from 14 to 24 fathoms.

Nearly half a mile west-south-west of the Sisters is a bank with 3 fathoms water over it, and a short distance westward of this bank is another with a depth of 5 fathoms.

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Beacon.—A stone beacon, painted red and surmounted by a basket, stands on the eastern side of Trumbu Selegi, situated about 7 cables north-west of the Sisters. Chart, 2,404 [2,526]. Lat. 1° 13¾′ N. Long. 103° 49¾′ E Var. 1° 10′ E.

St. John islands (pulo Sakijang), with Peak island, form the south-western limit of Singapore road.

St. John's or Quarantine island and Lazarus or Convalescent island are each about three-quarters of a mile in length, in a north-west and south-east direction, by about 3 cables in breadth, and fringed by a reef extending from a half a cable to one cable. Lazarus island is 180 feet above high water.

Peak island, or pulo Tambákul, about 2 cables eastward of Lazarus island, is 92 feet above high water, and encompassed by a reef which extends about three-quarters of a cable in a southerly and south-easterly, and 2 cables in a north-westerly, direction.

Between these islands are narrow channels about half a cable wide, with depths of from 6 to 16 fathoms.

Obelisk.—A white stone obelisk on the south-east side of Peak island, marks the southern limit of Singapore road. Lat. 1° 13½′ N, Long. 103° 51¼′ E.

Pulo Sekuker.—In the space between St. John islands and Blakang Mati, are a few small islands, pulo Renget and pulo Sekuker, 81 feet above high water, being the principal; there are also several reefs.

The channels between these islands are too intricate for ordinary navigation, except that northward of pulo Sekuker, which is occasionally used by coasting craft, the tidal swirls, and eddies, are very strong near a 17 feet patch in the fairway northward of pulo Sekuker.

Clearing marks.—To avoid all the dangers between St. John islands and Malay point, Peak island must not be brought to bear to the eastward of S. ⅛ E., whilst mount Serapong bears northward of W. by N. ⅞ N. When mount Serapong is to the westward of that bearing, a vessel may approach Blakang Mati island until the western extreme of St. John's island bears S. by W. ½ W.

BLAKANG MATI ISLAND lies to the southward of the southern part of Singapore island, from which it is separated by Keppel harbour. The island is 2 miles in length in an east-south-east and west-north-west direction, and its western end terminates in a point, but its eastern extreme is one mile in breadth. Chart, 2,023 [2,527].

Barracks are built on the hill close westward of mount Serapong, and a military road runs the whole length of the island.

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Chart, 2,023 [2,527]. Var. 1° 10′ E.

Reefs.—The island is fringed by a reef, which from tanjong Berhala, its north-eastern extreme, projects a quarter of a mile; this part of the reef is known as Berhala spit, and from its outer extreme tanjong Berhala bears W. $\frac{7}{8}$ S.; thence it trends for the eastern extreme of the island, from which it projects but a short distance.

Off the south point of the island the reef fronting it extends about $1\frac{1}{2}$ cables, thence about the same distance along its west side; but a small detached reef named Pelawan, about $1\frac{1}{2}$ cables in extent, lies 2 cables from the west side of the island, at three-quarters of a mile from its north-west point.

Lat. 1° 15′ N. Long. 103° 50¼′ E.

Mounts Serapong and Imbea.—Mount Serapong, 290 feet above high water, crowned with trees, and situated near the north-eastern extreme of Blakang Mati, is conspicuous when approaching Singapore road from the eastward, and will assist a stranger in making out the land, St. John islands being seen to the southward of it. There are several other hills of less height than Serapong upon Blakang Mati, but they are more observable in coming from the westward, when they will be seen under the higher land of Singapore island.

Lat. 1° 15½′ N. Long. 103° 48¼′ E.

Over tanjong Rimau, the west extreme of the island, is mount Siloso, 153 feet high, surmounted with a clump of fir trees, the tops of which are 226 feet above high water. Eastward of Siloso, and south from Berdaun island, is mount Imbea, 204 feet above high water, and other hills to the eastward, all of which are covered with small trees and scrub. Mount Imbea has on its summit a trigonometrical station, marked by a pole imbedded in a stone.

Chart, 2,404 [2,526].

Temporary anchorages for sailing-vessels.—Owing to the strong tidal streams, in the western part of Singapore strait, sailing vessels are frequently obliged to anchor, for which purpose the north side of the channel is to be preferred.

Between Sultan shoal and Raffles lighthouse on that side there is convenient anchorage in from 6 to 12 fathoms water, while to the southward the water is deep, and the bottom rocky; the south side of this part of the strait is, therefore, unsuitable for anchorage, especially as violent squalls are of common occurrence. The most convenient anchorages between Raffles lighthouse and St. John islands are the banks which front the Sisters and Middle islands.

Abreast of the south end of St. John islands, vessels ought not to anchor if it can be avoided, for the water is deep, and the tidal streams and eddies run with greater strength than in any other part of the strait.

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Chart 2,404 [2,526]. Var. 1° 10′ E.

There is fair anchorage between Buffalo rock and Helen Mar reef, as well as about one mile or so to the northward and westward of the latter danger; also from one mile to 2 miles eastward of Buffalo rock, in 12 to 19 fathoms, or between it and Barren island. Vessels may stand closer inshore and anchor in depths under 10 fathoms, southward of a line N.E. by E. ½ E. and S.W. by W. ½ W. of Barren island; it is however unadvisable to go too close in, on account of the strong tidal streams, sometimes rendering it difficult to get under weigh again, especially in the light winds which prevail here.

Vessels at anchor, or coming to an anchor during the night, should be careful to ascertain their position as nearly as possible, and to have a good bearing of Raffles light; they should also keep a vigilant look-out that they do not drag their anchors and drift into danger.

Charts, 2,403 [2,525], 2,404 [2,526]. Lat. 1° 12½′ N. Long. 103° 28′ E.

Directions.—To proceed eastward through the western part of Singapore strait, from a mid-channel position between Little Karimon and tanjong Bulus, where there are depths of from 17 to 22 fathoms, steer between East and E.S.E. as the prevailing tidal stream may require.

No directions are necessary for a steam vessel, beyond keeping in the fairway.

Raffles lighthouse bearing between E.S.E. and E. by S. is the fair channel course between Tree island and Sultan shoal light; at night, Raffles light should be kept bearing southward of East, if on the south side of the channel, to avoid Tree island reef; and eastward of S.E. by E. if on the north side.

Having passed Tree island steer to round Raffles lighthouse from half a mile to one mile distant; or if the wind and tidal stream be adverse, or from other circumstances it be desirable to do so, anchor to the westward of Barn island, out of the strength of the stream. Having rounded the lighthouse, steer to pass St. John islands about half a mile distant, keeping Raffles lighthouse bearing westward of S.W. by W. ⅞ W., to avoid the rocks south-eastward of Middle island. At night, keep Raffles light in sight bearing W.S.W. or more westerly.

After passing Lazarus island, and bound to Singapore road, proceed as directed at page 248; but if bound through the eastern part of the strait, shape course E. by N. ½ N. to pass northward of Horsburgh light, and proceed as directed at page 262.

In working through between St. John islands and Raffles lighthouse, it is usual to keep on the north side of the channel, making short tacks if necessary, as that part of the strait affords tolerably convenient anchorage along the greater portion of it, and vessels are liable

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Charts, 2,403 [2,525], 2,404 [2,526]. Var. 1° 10′ E.

to meet with light baffling airs which would render it necessary to anchor. It is especially requisite to attend to this when eastward of Buffalo rock, for on that part of the south side of the strait the water is deep, and the bottom rocky and unsafe for anchoring, the danger being much increased by rapid tidal streams with eddies and overfalls.

All danger on the north side of this part of the channel will be avoided if the south extreme of St. John's island be kept northward of N.E. by E. $\frac{1}{3}$ E., or Raffles lighthouse westward of W.S.W., but these bearings more particularly apply to the rock which lies south-eastward of Middle island. While to the westward of the rock, vessels may stand to the northward until the south end of St. John's island bears E.N.E.; and eastward of the rock between Middle island and the Sisters, as far as E. by N., observing that pulo Jong open westward or eastward of Middle island, clears the rock.

Approaching Buffalo rock from the westward, a vessel will be westward of it until Middle island bears N. by W. $\frac{1}{2}$ W., and in daylight may stand to the southward, if necessary, until Red islet bears W. $\frac{3}{4}$ S., which leads northward of Helen Mar reef, but it is better to keep over towards the lighthouse. When Middle island bears N. by W. $\frac{1}{2}$ W., keep Raffles lighthouse to the southward of W. $\frac{1}{4}$ S. until eastward of Buffalo rock.

For proceeding westward, reverse the above directions.

Chart, 2,404 [2,526]. Lat. 1° 9¾′ N. Long. 103° 44¾′ E.

Tidal streams.—It is high water, full and change, at Raffles lighthouse, at 11h., but the stream does not set to the eastward till two hours later, and it is then about half ebb by the shore.

The tidal stream from Malacca strait and from the China sea meet between Tree island and tanjong Bulus, but no dependence can be placed upon them; they sometimes run strong towards Durian strait, and at other times northward towards the Old strait of Singapore. For streams farther to the westward, *see* pages 213, 215, and to the eastward, page 261.

Also from Tree island to Raffles lighthouse the streams cannot be depended on to set as fairly through the channel as they do to the eastward of the lighthouse, but may be expected to draw more across the channel in a north-easterly and opposite direction. The streams set fairly through the channel about E.N.E. and W.S.W. between Raffles lighthouse and St. John islands, frequently very strong, with eddies on the springs. Their greatest velocity is from 4 to 4½ knots per hour.*

The tidal stream has been observed in both monsoons to run to the westward 10 or 12 hours at a time, or even 18 hours, strong and weak

General chart, 2,403 [2,525].

* It is stated that in the southern part of the strait, near Batu Beranti, the flood stream is deflected to the southward setting S.S.W. near that rock, and that here the ebb stream sets N.N.E., also that these streams may run in either direction for from 10 to 18 hours with rates of from 2 to 5 knots, and sometimes 6 knots an hour, but this statement requires confirmation.

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alternately; at other times it sets only 6 hours to the westward and the same length of time to the eastward. During the strength of the north-east monsoon, at neap tides, the stream sets to the westward at times for three or four days, although there is a regular rise and fall by the shore. (*See* streams in Keppel harbour, page 240.) Chart, 2,404 [2,526]. Var. 1° 10′ E.

CAUTION.—In hazy weather during the night, great care must be taken in steering between Raffles lighthouse and tanjong Bulus, as no dependence can be placed upon the set of the tidal streams, which sometimes run strongly towards the strait of Durian, at other times to the northward towards the Old strait of Singapore.

KEPPEL HARBOUR, the name given to the channel between Singapore and Blakang Mati islands, is about 2¾ miles in length, in an east and west direction, but the main channel takes a somewhat serpentine course; the breadth of the harbour in several places is not more than 1½ cables. Chart, 2,023 [2,527].

The harbour and both entrances to it have sufficient water for all classes of vessels, and there are depths of from 18 to 40 feet alongside the wharves at low water.

Entrances.—The western entrance is a little more than one cable wide, and lies between tanjong Rimau and tanjong Blayer. The eastern entrance lies betweeen tanjong Pagar and Buran Durat reef. Lat. 1° 15½′ N. Long. 103° 48¼′ E.

As an anchorage, Keppel harbour is indifferent, but the harbour authorities do not now permit vessels to anchor except under special circumstances (*see* page 241).

Situated as it is in the very centre of Eastern commerce, Keppel harbour is of considerable importance and possesses extensive dock and wharf accommodation of the highest possible value. The Colonial Government, the Peninsular and Oriental Company, together with other steamship proprietors and merchants, have extensive coal stores, capacious docks, wharves, and jetties, the latter allowing of the largest steam vessels being lashed alongside in perfect security. It is the place of arrival and departure of the mail steamers; and all other steam vessels proceed here to coal.

The whole of the above establishments are situated on the north or Singapore side of Keppel harbour.

Both sides of the harbour are fringed with reefs which dry at low water, but close to their edges there are usually depths of 5 to 4 fathoms, increasing suddenly to 5 and 6 fathoms, and to this circumstance Keppel harbour owes its importance.

Submarine mine fields.—Practice with submarine mines takes place near both the western and eastern entrances of Singapore:—Vessels

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Chart, 2,023 [2,527]. Var. 1° 10′ E.

are prohibited from either navigating in, or anchoring over, the area set apart for the above mine fields, as obstructions may be met with.

Lat. 1° 15½′ N. Long. 103° 51′ E.

The mine field near the eastern entrance to Singapore, on the south side of Salat Sinki, is a rectangular area extending about one cable eastward of the western beacon on Buran Duran reef, and above 1½ cables northward of the reef.

The depôt is on the west end of pulo Brani (page 237).

Buoys.—The limits of the mine field southward of tanjong Rimau, at the western entrance, are marked as follows:—On the north-west by a line from tanjong Rimau, extending 5 cables south-westward, there marked by a spherical buoy painted red, thence by a line drawn to a similar buoy placed one mile south of that point, and thence by a line extending in a north-east direction to Blakang Mati.

Communication.—Frequent communication by Peninsular and Oriental, British India and other ocean-going steamers, also by local steamers. A railway across the island from Singapore to Woodlands station on Johore strait opposite Johore Baru, a distance of about 14 miles. Telegraphic communication with all parts; the telegraph office is always open. *See* Chapter I., page 4.

Coal and supplies.—From 110,000 to 160,000 tons of coal are kept in stock; also 4,500 tons of liquid, and 15,000 tons of patent fuel. From 2,000 to 6,000 tons can be put on board in 24 hours; coaling is carried on by baskets. About 585,000 tons of coal and 25,000 tons of liquid fuel are imported annually.

Every description of supplies are to be obtained, and good water from boats with steam pumps.

Coaling wharves.—Vessels of war and most of the large steam vessels make use of the extensive wharf accommodation belonging to the Colonial Government; the wharves are easy to go alongside.

The dimensions of, and depths alongside, the principal wharves are as follows:—

The Colonial Government have six wharves, the lengths of which are 1,200, 370, 2,845, 1,800, 420, and 300 feet, the depths alongside being from 21½ to 50 feet.

Keppel harbour wharf, length 1,419 feet; depths from 16 to 26 feet.

Peninsular and Oriental Steamship Company have two wharves, each 300 feet in length, with depths of 21 and 27 feet respectively.

The Straits Trading Company's wharf is 375 feet in length, with a depth of 17½ feet, and the wharf belonging to Messrs. Sabine & Co. is 742 feet in length, with 30 feet alongside.

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Docks.—The following are dimensions of the docks at Singapore:— Chart, 2,023 [2,527]. Var. 1° 10′ E.

Dock.	Length over all.	Length on Blocks.	Breadth of entrance. H.W O.S.	Depth on Sills. H.W.O.S.	Depth on Blocks. H.W.O.S.
	Feet.	Feet.	Feet.	Feet.	Feet.
Keppel Harbour dock, No. 1	—	352½	47½	15	15
„ „ No. 2	459	444	65	19	18
Victoria dock - -	467	458	64	19	19
Albert dock - - -	478	471	59	20	20
New dock (constructing)	800	—	100	40	—

Keppel harbour dock.—No. 1 dock is built partly of granite and partly of native stone, with a wooden floor; largest vessel docked 287 feet long, 36 feet beam, 14½ feet draught. Lat. 1° 16′ N. Long. 103° 49′ E.

No. 2 dock is constructed of granite throughout, and is capable of sustaining any weight; largest vessel docked 370 feet long, 48 feet beam, 18½ feet draught.

Victoria dock has a breadth of 56½ feet at the level of the sill. Lat. 1° 16′ N. Long. 103° 50¾′ E.

Albert dock has a breadth of 55½ feet at the level of the sill; largest vessel docked in Victoria and Albert docks 452 feet long, 48 feet beam, 19½ feet draught.

Patent slips.—There are four patent slips:—No. 1 is 155 feet in length and 22 feet in breadth on the cradle.

No. 2 slip is 95 feet in length and 17 feet in breadth on the cradle, and will take a vessel of about 80 tons.

No. 3 slip is 120 feet in length and 17 feet in breadth on the cradle.

A small slip is 60 feet in length on the cradle.

Repairs.—The steam sheers on the Colonial Government sheer wharf, which has a low-water depth alongside of 28 feet, will lift 40 tons; and the steam sheers on another wharf, which has a depth under them of 24 feet, will lift 45 tons. A vessel of 450 tons has been built, engines of 500 H.P. made, and repairs to hulls, engines, and boilers of vessels of the largest class can be effected by the dock companies; spare shafts are kept in stock, in sizes varying from 12 inches by 26 feet and under. The barracks at the docks accommodate crews of 500 and 250 men. Repairs to native craft are effected at Tanjong Rú, *see* page 246.

Tugs.—Powerful tugs are available when required.

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Chart, 2,023 [2,527]. Var 1° 10′ E.

Pilots for Singapore are usually to be found near Sultan shoal. If none are there at daylight in their steam launches in the track of vessels off Sultan shoal, the signal station on mount Faber will always repeat the signal for a pilot, and one will go out; but pilotage is not compulsory.

The pilot boats are painted white; have the word "Pilot" painted on each bow, and marked in black on the sail, if such is carried; they also show a red and white flag (horizontal, upper half white) with letter P., in blue, in the centre.

Pilotage waters include the area lying within lines drawn from the obelisk on tanjong Katong to the obelisk on Peak island; from the latter to the south-east extreme of John's island; from the latter to Sultan shoal lighthouse, and thence to the north-east extreme of Cyrene shoal, produced to meet Singapore island.

Pilots will always be found at the Pilots' Club in Keppel Harbour; *see* Directions, page 241.

Coaling signals.— Vessels requiring coal should hoist the Commercial Code rendezvous flag at the dip, when a similar flag will be waved from the wharf to which the vessel can go alongside.

The Colonial Government wharves are divided into sections, numbered from 1 to 9 from the eastward, and large black figures are hoisted at the yard-arms of the Pilots' Club flagstaff, indicating the number of the wharf allotted to the vessel denoted.

When a vessel is entering from the westward, the number of the wharf assigned will be hoisted at the north yard-arm; if entering from the eastward, from the south yard-arm; when more vessels than one are entering, from either direction, numbers are added below the upper number, and correspond to the order in which the vessels enter; *i.e.*, the vessel ahead follows the direction given by the upper number, and so on. When the channel is not clear for a vessel to go alongside, a black ball is hoisted at either yard-arm in place of a number, its position denoting the vessel signalled, which must remain outside until the number of the wharf is made.

An anchor hoisted at either yard-arm, denotes, by its position, that the vessel indicated should anchor outside, no wharf accommodation being available at the time.

Lat. 1° 15¾′ N. Long. 103° 48½′ E.

NORTH SIDE OF KEPPEL HARBOUR.—Tanjong Blayer, the north-west entrance point to Keppel harbour, is formed of cliffs 47 feet above high water. From thence the cliffy coast line trends in a north-westerly direction, backed by a ridge of densely wooded hills, and is fringed with a white beach named Pasir Panjang, or Long beach, fronted by a reef, half a cable in width.

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Between tanjong Blayer and Bukit Chermin there is an impassable mangrove swamp into which Blayer river empties itself, off the mouth of which river a reef extends about one cable. Chart, 2,023 [2,527]. Var. 1° 10′ E.

Obelisk.—About 50 yards from tanjong Blayer, stands a white obelisk denoting the harbour limit in this direction.

Pier.—At 130 yards north-eastward of tanjong Blayer is a military pier, with 13 feet water at its extreme.

Lot's Wife is a rock about 6 feet above high water, lying immediately off the pitch of tanjong Blayer inside the edge of the shore reef, which is here "steep-to."

Beacon.—A white beacon, surmounted by a staff and ball, marks the south edge of the shore reef.

Blayer rock, with 7 feet water over it, lies rather more than half a cable, west-south-west, of tanjong Blayer.

A patch, having 3 fathoms water over it, lies W. ½ N. distant 2¾ cables from tanjong Blayer, and is the shoalest part of a bank having depths of from 3½ to 4½ fathoms, with 7 and 8 fathoms close to its outer edge; there is a depth of 6 fathoms between this bank and the reef fronting Pasir Panjang beach.

The Pilots' Club flagstaff in line with tanjong Tereh, a conspicuous red bluff on the north end of pulo Brani, bearing N. 83° E., leads southward of the 4½ fathoms bank and Blayer rock.

Hantu, the small round island lying in front of Chermin bay, is nearly 1½ cables in diameter, 133 feet above high water, and covered with trees. A reef surrounds the east, south, and west sides of the island; the north-east side, opposite the dry dock, is nearly free from reef, with depths of 3 fathoms at 50 yards from the island.

Beacon.—The edge of the reef, on the south side, is marked by a white beacon surmounted by a staff and ball. Lat. 1° 15¾′ N. Long. 103° 49′ E.

Chermin bay, eastward of Bukit Chermin and northward of Hantu island, has depths of 4½ to 6 fathoms.

Keppel Harbour docks and wharves, about 500 yards in length, are situated on the east side of Chermin bay. Westward of the sheers, the depth alongside the wharves at low water springs is from 16 to 18 feet, and eastward of the sheers from 23 to 24 feet.

Eastern Extension Telegraph Co.'s wharves, westward of Keppel Harbour docks, are situated at the head of Chermin bay.

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Chart, 2,023 [2,527]. Var. 1° 10′ E.

They are about 350 feet in length, with a least depth of 18 feet alongside at the eastern end and 26 feet at the western end, and are somewhat more difficult for a large vessel to get alongside than the other wharves.

Peninsular and Oriental Co.'s wharves. — About one-third of a mile eastward of the Keppel Harbour wharves are the Peninsular and Oriental Co.'s wharves, which have extensive coal stores and warehouses behind them. These buildings are on ground that was once a small island, but now connected to Singapore by a road and tramway.

The western wharf has a depth of 25 feet alongside at low water; the centre and smallest wharf depths of from 15 to 16 feet, and the eastern wharf from 22 to 25 feet, but about 30 yards off this latter wharf, is a rocky patch with 19 feet water over it, and 25 feet between.

Keppel rock, with 4 fathoms water over it, lies S.W. by W. $\frac{1}{2}$ W. distant three-quarters of a cable from the western extreme of the Peninsular and Oriental Company's wharf; close around the rock are depths of $4\frac{3}{4}$ and 6 fathoms. The south extreme of St. James' hill in line with the eastern extreme of the Peninsular and Oriental Company's jetties, bearing E. by N. $\frac{5}{8}$ N., leads southward of the rock.

Telok Sibet, eastward of the Peninsular and Oriental wharves, dries near low water; on the opposite side of this bay, at about one cable to the eastward, is St. James' hill, 50 feet above high water, having a house partly hidden by the trees on its summit, and is a beautiful feature in the delightful scenery of this harbour.

Lat. 1° 15¾′ N. Long. 103° 49¾′ E.

Submarine telegraph cable.—The submarine telegraph cable crosses the harbour from the east side of St. James' hill to pulo Brani, near the torpedo establishment; there is a notice board on either shore marking it, warning vessels not to anchor over it.

Patch. — At half a cable south-south-west from the south-west extreme of St. James' hill is a patch with a depth of $2\frac{1}{4}$ fathoms, and deeper water between it and the shore reef.

Clearing mark.—The Pilots' Club flagstaff just shut in with tanjong Tereh, bearing N. 82° E. when nearing Keppel rock, clears it and the $2\frac{1}{4}$ fathoms patch.

Telok Blanga, on the east side of St. James' hill, is about one cable wide at its entrance and dry at low water.

The Colonial Government wharves. — From Telok Blangah to tanjong Pagar, a distance of over a mile, the shore is occupied by the Colonial Government wharves, docks, and coal stores, the docks and factories being situated near the eastern end.

General chart, 2,403 [2,525].

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This stretch of wharves is divided into sections, Nos. 1 to 9, numbered from the eastward. Chart, 2,023 [2,527]. Var. 1° 10′ E.

The western wharf (Jardine's) is 300 feet in length, with a depth of 18 feet at low water at its eastern half and 25 feet at the western.

The Brani ferry boats start from near the western corner of this wharf.

The western Borneo wharf is 440 feet in length, with a least depth of 18 feet alongside near its centre and 22 to 30 feet in other parts.

Eastward of this wharf the depths alongside range from 22 to 30 and 40 feet at low water.

No. 1 section extends from the East wharf, near tanjong Pagar, to the entrance to Victoria dock.

No. 2 section, from the preceding limit to the east end of No. 14 building.

No. 3 section, from the preceding limit to the west end of No. 16 building.

No. 4 section, from the preceding limit to the west end of No. 19 building.

No. 5 section, from the preceding limit to the east end of No. 23 building.

No. 6 section, from the preceding limit to about a quarter of a cable westward of No. 27 building.

No. 7 section, from the preceding limit to a quarter of a cable westward of No. 31 building.

No. 8 section, from the preceding limit to the west end of No. 38 building.

No. 9 section is the wharf next eastward of Jardine's wharf.

In 1903 there were only two berths suitable to vessels of heavy draught, and having 28 feet at low water, viz., Section No. 6, and a berth at the eastern end of the wharves.

East wharf.—The East wharf extends nearly one cable, in an east-south-east direction, from tanjong Pagar, and nearly a cable further in the same direction, is the southern extreme of a line of sunken hulks which extends 2½ cables in a N. by W. direction. A large portion of the bight northward of this is being reclaimed, and a space dredged to form a basin for vessels.

LIGHT.—A *red fixed* light is shown from the stern of a hulk, situated about one cable east-south-east from the extreme of the East wharf and should be visible, in clear weather, from a distance of 5 miles. Lat. 1° 15¾′ N. Long. 103° 51′ E.

Pilots' club is situated close to the east side of entrance to the Albert dock, and is distinguished by a flagstaff with signal yard upon

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Chart, 2,023 [2,527]. Var. 1° 10′ E.

which the signal is hoisted to indicate the section to which a vessel is to proceed alongside. Pilots are always to be found here.

Observation spots. — For the convenience of shipmasters three large flat stones have been placed for astronomical observations. One of these is placed near the Pilots' club, at the entrance to Albert dock, and is in lat. 1° 15′ 55″ N., long. 103° 50′ 41″ E. The other two are at the east and west ends of the Borneo wharf, the western being in lat. 1° 15′ 57″ N., long. 103° 49′ 50″ E.

Lat. 1° 16½′ N. Long. 103° 49½′ E.

Mount Faber is the name of a conspicuous range of hills which rises boldly near the middle of the northern shore of Keppel harbour. The direction of the range is about north-west and south-east, the highest point, 347 feet above high water, being towards its north-west end.

Time signal.—*See* page 244.

Signal staff.—Near the middle of the range is a flagstaff, which like that upon fort Canning hill, is crossed by two yards, used for signalling the arrival of vessels from the westward, and repeating the signals made from fort Canning. The height of the range where the flagstaff stands is 295 feet, nearly the same height as mount Serapong on the opposite side of Keppel harbour.

Lat. 1°16′03″.33N. Long. 103° 49′ 23″.86 E.

The observatory is situated about 1½ cables south-eastward of the signal staff.

Guthrie hill, 100 feet above high water, is isolated and conspicuous, and situated about a quarter of a mile northward of the Colonial Government docks.

Lloyd's signal stations.—There are Lloyd's signal stations at mount Faber and fort Canning.

Lat. 1° 15½′ N. Long. 103° 48¾′ E.

SOUTH SIDE OF KEPPEL HARBOUR.—Tanjong Rimau, the north-west extreme of Blakang Mati island and the south-west limit of Keppel harbour, is formed of cliffs with patches of shelving rock projecting from their bases. The shore reef extends one-third of a cable in a westerly direction from the point, with from 9 to 16 feet water close-to, and from 3 to 4 fathoms beyond.

Pier.—Nearly 2 cables eastward of tanjong Rimau is a military pier with about 10 feet at low water at its extreme; a road leads thence to mount Serapong and the barracks.

Berdaun island is a small patch of coral covered with mangrove trees, the tops of which are 18 feet above high water; it is distant about half a mile eastward from tanjong Rimau, and half a cable from the Blakang Mati shore. A reef, dry at low water, extends about two-thirds of a

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cable westward, and about a third of a cable northward and eastward from the rock, with shallow water a short distance beyond it. Chart. 2,023 [2,527] Var. 1° 10′ E.

Selegi island lies near the western entrance of Salat Sinki, about 1½ cables to the eastward of Berdaun island, and fronts a bight, dry at low water, named Imbea bay. It is a remarkable little island, 86 feet above high water, wooded, almost circular in shape, and has a stone pier on its north-east side.

Mæander shoal, about one cable in extent, east and west, with 1½ fathoms least water, lies on the south side of the fairway of Keppel harbour, 1¼ cables southward of the Peninsular and Oriental Company's wharves.

Buoys.—The north-west and north-east sides of the shoal are each marked by a buoy, painted red and surmounted by a sphere.

PULO BRANI, on the south side of Keppel harbour, is nearly two-thirds of a mile in length, in an east and west direction, with an extreme breadth of 4 cables. On its north-eastern side are three hills, the middle one, which is the highest, being 157 feet above high water, and covered with low trees; the northern hill has barracks on it.

Tanjong Tereh, the north extreme of the island, and tanjong Teregeh, the south-east extreme, are both formed by cliffs; those forming the northern point are of a red colour, and present a bold red bluff, which is conspicuous when viewed from either entrance of the harbour.

This island, like Blakang Mati, is encircled by a coral reef with occasional patches of sand, which uncover at about two-thirds ebb, and from tanjong Risim, the west end of the island, extends 1¾ cables and forms a spit.

Beacon.—The outer edge of the spit extending from tanjong Risim, is marked by a stone beacon, painted white and surmounted by a ball. Lat. 1° 15½′ N. Long. 103° 49½′ E.

Teregeh spit.—The eastern side of the island is fronted by Brani reef, which extends off tanjong Teregeh nearly a quarter of a mile; this extreme is known as Teregeh spit, and shoal water, with depths of less than 3 fathoms, extends nearly a cable north-eastward of it.

Beacons.—The extreme of Teregeh spit is marked by a stone beacon painted white and surmounted by a ball, and a similar beacon stands on the edge of the reef, three-quarters of a cable south-eastward of tanjong Teregeh.

Submarine mine depôt.—Just to the north-eastward of tanjong Risim, are the torpedo stores, with a convenient pier extending a little beyond low water. The Royal Engineer officers' quarters and barracks are close-to. *See* submarine mine-fields, page 229.

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Chart, 2,023 [2,627]. Var. 1° 10′ E.

Saga bay lies between tanjong Risim and tanjong Tereh, and is dry at low water; here is an uncompleted dry dock in ruins, and close north-eastward of it there are coal stores. A jetty with a depth of 18 feet alongside extends north-westward of the coal stores, but, owing to the strength of the ebb stream, only small vessels use it.

Tin works.—On the south side of pulo Brani are tin smelting works, with a wharf 150 feet in length, having from 18 to 20 feet water alongside. The Bon Accord dock (in ruins) is situated on these works.

Engineering works.—Eastward of the tin works are the Government Engineering Works, which are capable of undertaking small repairs.

SALAT SINKI, the channel between pulo Brani and Blakang Mati, with a least depth at low water of $3\frac{1}{4}$ fathoms in the fairway, is navigable for vessels of moderate draught, but owing to the uncertainty of the direction of the gusts of wind caused by the adjacent high land, it can scarcely be considered as safe for sailing vessels.*

The strait is partially barred about midway by a narrow bank with a depth of 2 fathoms at low water near its centre, extending more than half way across from the military pier on the south shore. There is a patch of $2\frac{3}{4}$ fathoms in the fairway westward of it, and a detached reef, dry at low water, lies about three-quarters of a cable off pulo Brani, westward of the tin works.

A submarine mine-field is set apart on the south side of the eastern entrance, mentioned on page 230.

Lat. 1° 15½ N. Long. 103° 50′ E.

Beacons.—On the north side of Salat Sinki, in addition to the white beacons on tanjong Teregeh and on Teregeh and Risim spits, previously mentioned, a stone beacon, painted white and surmounted by a ball, marks the southern edge of the detached reef westward of the tin works. There is a patch with a depth of 7 feet over it, situated E. by S. ¼ S., distant half a cable from this beacon.

On the south side a stone beacon, painted red and surmounted by an iron cage, marks the extreme of Berhala spit, and a similar beacon, but surmounted by a ball, the edge of the reef, three-quarters of a cable northward of tanjong Berhala.

Mooring buoys.—There are two mooring buoys, painted red, off the Government Engineering Works.

Tidal streams.—The tidal streams in Salat Sinki run with considerable strength, the flood to the westward and the ebb to the eastward, with no slack water; there are swirls and eddies at the eastern entrance and on the spit extending from the military pier.

General chart, 2,403 [2,625].

* The western approach to Keppel harbour is also known as Salat Sinki.

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EASTERN ENTRANCE TO KEPPEL HARBOUR.

Chart, 2,023 [2,527]. Var. 1° 10′ E.

—Depths.—The eastern entrance is divided into three channels by shallow banks. The north channel affords the best water, the least depth being about 6 fathoms at low water, between Tembaga shoal and the wharves. Middle channel has not less than 4 fathoms on a strait course, and South channel about 3¼ fathoms. Directions, *see* page 242.

Brani shoals lie at the eastern entrance of Keppel harbour, between tanjong Pagar and pulo Brani, and within a depth of 3 fathoms, extend about 4 cables in the direction of the channel. The least water upon these shoals is 11 feet.

Buoys.—Too much dependence must not be placed on the buoys maintaining their charted positions, but the harbour authorities remoor them from time to time.

Brani shoals are marked by four buoys painted white and surmounted by balls, and are moored in from 2½ to 3 fathoms water, one being placed at each end, and one on either side; the shoalest water lies almost midway between the two latter. A patch, with a depth of 3 fathoms over it, lies half a cable E. by S. from the south-east buoy.

Brani reef, extending from pulo Brani, on west side of South channel, is marked by two buoys painted black and surmounted by balls; the southern lies N.E. ¼ N. distant 1¼ cables from Teregeh spit beacon, and the northern one-third of a cable off the reef abreast Brani bay.

The depths decrease gradually towards the shoals, except along the south-western edge; but elsewhere the lead, if properly attended to, will show when a vessel is nearing them.

Tembága rocks, drying in patches at low water, spring tides, lie between the Colonial Government docks and Brani shoal, and are about half a cable in length in a north-west and south-west direction, and from 20 to 30 yards in breadth.

Lat. 1° 16′ N. Long. 103° 50½ E

Beacons.—The north-west and south-east extremes of Tembága rocks are each marked by a stone beacon, painted red and surmounted by a ball.

Tembága shoal, about half a cable in extent, and with a depth of 9 feet over it, lies three-quarters of a cable north-westward of Tembága rocks.

Buoy.—The north-eastern end of Tembága shoal is marked by a buoy painted red and surmounted by a ball.

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Chart, 2,023 [2,527]. Var. 1° 10′ E.

Tides.—It is high water, full and change, at the Colonial Government Dock offices, at 10h. 35m.; ordinary springs rise 8 feet, neaps 5 feet, above the datum of the plan and of the published tide tables for Singapore, but the water frequently falls as much as 1½ and even 2 feet below this datum. The low water is affected by a large diurnal inequality amounting to several feet.

The highest high water is that following the superior transit of the moon when it has north declination, and the inferior transit when the moon has south declination. The inequality in the heights of the tide, after two successive transits, disappears when the moon has no declination.

Tidal streams.—In Keppel harbour the streams run strongest between the western entrance points and off the north end of pulo Brani.

The ordinary rate of the tidal stream at springs is 2 knots, the flood setting to the westward, and the ebb to the eastward, changing with high and low water by the shore, but this is not to be depended on; it is much influenced by the prevailing monsoon, and often runs 4 knots at springs.

During the north-east monsoon, at neap tides, although the water rises and falls, yet the stream sometimes runs to the westward, for two, three, or four days consecutively; at other times it may be as many days quite still, or a rush of water will flow into or out of the harbour at the rate of 3 and 4 knots. These fluctuations occur most frequently during the north-east monsoon, and depend chiefly on the force of the wind in the China sea, yet they sometimes happen in the south-west monsoon, without any apparent cause. Tide tables for Singapore may be purchased.

Lat. 1° 16′ N. Long. 105° 50½′ E

At the Colonial Government wharf there is a self-registering tide gauge.

Eddies.—In Chermin bay the streams sweep round Hantu island with considerable force, but close to the Telegraph Company's wharves at the head of that bay is an eddy stream on both tides. There is also a slight eddy at each end of the P. and O. Co.'s wharves.

Alongside the wharf at Saga bay, pulo Brani, it is quite slack water on the flood, but the ebb runs strongly.

There is a strong eddy on the ebb, about 1½ cables eastward of the projecting Borneo wharf.

The flood stream sweeps to the westward along the Colonial Government wharves from the dry docks as far as the Borneo wharf with very little strength, but thence it runs strongly. On the flood, on the western

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side of tanjong Pagar, the projecting line of wharves causes slack water on that side. Approaching tanjong Pagar, if unaware of this fact, the bow being in slack water with a strong current on the quarter, an awkward sheer might be experienced and should be guarded against.

Chart, 2,023 [2,527]. Var. 1° 10′ E.

Anchorage.—The general depths in Keppel harbour are from 6 to 8 fathoms, but the bottom is foul, rocky, and indifferent holding ground, and care is necessary to prevent fouling the anchors.

The harbour authorities, however, do not permit vessels to anchor in Keppel harbour, except under special circumstances, as it obstructs the traffic.

Vessels, waiting for a few hours preparatory to dropping alongside the wharf, are occasionally anchored off the Royal Engineers' pier, on pulo Brani, and this anchorage used to be considered the best in Keppel harbour. They are sometimes temporarily anchored south-westward of tanjong Tereh.

The tidal stream runs strongly at both anchorages, but close westward of the north-west buoy of Brani shoal, the streams are slacker.

Directions.—Although there is no great difficulty in piloting vessels into or through Keppel harbour, or alongside any of the wharves, strangers are recommended to employ pilots until sufficiently acquainted with the local peculiarities, which may possibly cause difficulties in such a place where the space is limited and the tidal streams are strong and uncertain.*

Western entrance.—Vessels proceeding into Keppel harbour through the western entrance, which is little more than one cable across, should keep in mid-channel, with the Pilots' Club flagstaff in line with tanjong Tereh, bearing N. 83° E., which will lead southward of the 3-fathoms patch outside the harbour, also of Blayer rock, and of the reef extending off Hantu, on which there is a white beacon.

Charts, 2,023 [2,527], 2,404 [2,526]. Lat. 1° 15½′ N. Long. 103° 48½′ E.

Approaching Keppel rock, the Pilots' Club flagstaff should be just shut in with tanjong Tereh, bearing N. 82° E., which leads southward of the rock, and clears the 2¼-fathoms patch southward of Telok Blanga.

From abreast Mæander shoal, keep in the fairway until it is known to which wharf the vessel is directed. *See* Coaling signals, page 232.

Approaching the western entrance of Keppel harbour, from the south-eastward, the channel between the Sisters and Middle island is recommended. Between the 3-fathoms shoals half a mile westward of the Sisters and the sunken rock south-eastward of Middle island, the channel is 1¼ miles in breadth. Pulo Jong kept open eastward of Middle island, bearing N.W. by W., leads eastward of the rock.

* For the directions for approaching Keppel harbour from the westward (by Salat Sinki) *see* page 222.

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Chart, 2,023 [2,527]. Lat. 1° 13¾′ N. Long. 103° 49¾′ E. Var. 1° 10′ E.

Trumbu Selegi, with beacon, nearly one mile north-westward of the Sisters, should be given a wide berth, thence to the entrance to Keppel harbour there are no dangers beyond a quarter of a mile off shore, but the submarine mine-field, page 229, must be avoided. Eastward of the Sisters, and between them and St. John's island, is a good channel, half a mile wide, for which the Admiralty chart is sufficient guide. In the fair channel the general depths vary from 10 to 17 fathoms.

Tidal streams.—The tidal streams are very irregular in the passages among these islands, running sometimes 4 knots an hour at springs.

Eastern entrance.—Vessels proceeding from Singapore road into Keppel harbour should steer to the south-westward, not approaching Malay point nearer than one mile, nor hauling to the westward until mount Faber signal station flagstaff is in line with the clock tower, on the Borneo wharf, bearing N. 71° W., which being steered for leads southward of Malay spit, and to the entrance to North and Middle channels. In rounding Malay spit the fishing stakes furnish a ready guide to vessels, the outer ends of the longest lines of stakes having 5 fathoms water near them.

Middle channel.—The above leading line being continued leads obliquely through Middle channel, crossing the northern tail of Brani shoals in 4 fathoms water. Better water will be obtained there by opening mount Faber, northward of the tower, as soon as the western Tembága rock beacon bears N.E. by E. ½ E.

To proceed through North channel, which is the best for vessels of heavy draught, having approached on the leading line above given; when at about 2 cables distance from the south-eastern beacon on Tembága rocks, steer midway between the beacons marking those rocks and tanjong Pagar wharves, to the wharf appointed by signal.

South channel. — Tanjong Selensing being steered for when bearing W. by N. will lead up to and between the black buoy off Teregeh spit and the white buoy at south-east extreme of Brani shoals; thence steer in the fairway past the Middle white buoy, and between the black and white buoys at the northern end of the channel, when course may be altered for the wharf appointed.

Proceeding alongside the wharves.—All vessels usually take a pilot; the tidal streams are so strong and variable, and the space for manœuvring so limited, that an intimate knowledge of the harbour is necessary. With a favourable strong stream it is sometimes necessary to go right through the harbour, and turn outside. (For details of wharves, *see* pages 233, 234.)

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SINGAPORE TOWN AND ROAD.—The town of Singapore, built on each side of the Singapore river, a small stream, only navigable for boats, is defended by batteries on Blakang Mati island, and a large military force is stationed here. In 1901 the population was 228,555. Chart, 1,995 [2,528]. Var. 1° 10′ E.

The commercial part of the town is on the south side of the river, the bank on that side being lined with quays and godowns for the landing and reception of merchandise. The river is usually crowded with cargo boats and many other descriptions of small craft on their way to and from the vessels in Keppel harbour, presenting a scene of extraordinary bustle and activity. Singapore is a free port; there are no harbour or tonnage dues.

The post office and master-attendant's office occupy a portion of the site of Fullerton battery, on the south point of the river, and handsome blocks of buildings have been erected to the southward of the spot, upon some land which was reclaimed from the sea for that purpose. These buildings very much improve the sea front of the town, and are conspicuous as it is approached from the eastward.

Dalhousie obelisk stands a little northward of the north point of the river, while close to the westward and to the southward of the obelisk are the courthouse and the town hall, two fine buildings; the public offices lie southward of these, and near the bridge across the mouth of the river.

Dalhousie obelisk is not visible from seaward, being hidden by trees, but the Victoria memorial hall, which stands in a triangular space, of which the obelisk, town hall, and courthouse are the points, has a conspicuous white tower.

On the north of Dalhousie obelisk, the esplanade extends along the sea front for the distance of a quarter of a mile, and the drive round it is the fashionable resort of the European residents in the cool of the evening. Behind the esplanade stands St. Andrew's church, one of the finest ecclesiastical structures in India, built after the model of Netley Abbey; the church has a fine tower, surmounted by a lofty spire, which is very conspicuous when viewed from seaward.

To the right of the church is a very large building, named the Raffles school; extending from which in the same direction are a number of handsome detached houses, standing in gardens. Beyond this line of houses, is an extensive native town, the greater part of which is hidden by tanjong Rú, a sandy point.

Fort Canning, rising abruptly behind, and overlooking the town of Singapore, is a hill 156 feet above high water, the crest of which is covered by Canning fort, named after a former Viceroy of India. Lat. 1° 17½′ N. Long. 103° 51′ E.

LIGHT.—A steel tower, painted white, on fort Canning, exhibits, at an elevation of 202 feet above high water, a *white* and *red occulting* light

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Chart, 1,995 [2,528]. Var. 1° 10′ E.

with a period of system of *twenty seconds* showing light for *seventeen seconds*, followed by an eclipse of *three seconds* duration. The light shows *red* from N. 13° W. to N. 28° W. over the dangers near Peak island; *white* from N. 28° W. to S. 84° W.; *red* from S. 84° W. to S. 74° W., and is obscured in other directions; it should be visible, in clear weather, from a distance of 18 miles.

Lloyds signal station.—There is a Lloyds signal station at fort Canning.

Johnston's pier, situated about a cable southward of the river entrance, affords landing for boats at all times of tide; and boats can usually enter the river, which has been recently dredged, at low water.

Lat. 1° 17¾′ N. Long. 103° 51¼′ E.

LIGHTS.—A *red fixed* light is shown from each end of the cross-head of Johnston's pier, and a small *green fixed* light from the pier at the south-east side of entrance to the river.

Hospitals.—The large hospital has 10 beds in the officers' and 50 in the seamen's wards; the hospital for contagious diseases is on St. John's island. The sailors' home accommodates 95.

Time signals are made from fort Canning, and from mount Faber, in Keppel harbour.

Each signal consists of a ball, hoisted as preparatory at 0h. 55m. 0sec. p.m., and dropped daily (Sunday excepted) by electricity at 1h. 0m. 0sec., standard time of the 105th meridian, or 0h. 55m. 17·6 secs., mount Faber Observatory mean time (Transit instrument at the Observatory), equivalent to 18h. 0m. 0sec. Greenwich mean time.

When the time signal ball at fort Canning or at mount Faber fails to drop correctly, the flag W. will be hoisted at the Time signal mast, and the ball lowered slowly by hand 5 minutes after 1h. p.m., but it will be again hoisted at 1h. 55m. p.m., and dropped at 2h. p.m.; should it fail a second time, the flag W. will be again hoisted.

Should the time ball be under repair, the flag W. will be kept flying until the repairs are completed.

An electric time bell for the use of shipping is fitted in the Wharf Superintendent's Office, tanjong Pagar. This time signal is in connection with the Observatory standard clock, and rings automatically at every hour of Greenwich mean time. Chronometer comparisons may be obtained by applying at the above office.

Observation spot.—A stone building on the pier on south side of the river entrance, 267·3 feet N. 16° 22′ E. (true) from the old observation spot in Fullerton battery (which has been demolished, and a drill hall built in its place) is in lat. 1° 17′ 14″ N., long. 103° 51′ 16″ E., deduced from the telegraphic determination made by Lieutenant-Commander Green, U.S.N., of the old observation spot in 1881–2.

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SINGAPORE ROAD has depths of from 6 to 10 fathoms, over mud, at about 1½ miles off the town of Singapore, and is available for all classes of vessels.* Chart, 1,035 [2,528]. Var. 1° 10′ E.

Banks.—Outer shoal, lying on the south-east boundary of Singapore road, is 1½ miles in length in a north-east and south-west direction, and from one cable to 5 cables in breadth, having depths of from 4 to 5 fathoms over the greater part of it, but some patches of 3¼ to 3½ fathoms lie near its south-west extreme.

Clearing marks.—The whole of fort Canning kept just open northward of Dalhousie obelisk, bearing N. 58° W., leads northward of Outer shoal; Peak island S.W. ⅞ S. leads eastward of it; and the southern extreme of Blakang Mati island S.W. by W. ⅓ W. leads north-westward.

A patch, about 2 cables in extent, having 4 fathoms least water, lies about a third of a mile south-westward of Outer shoal. Mount Serapong bearing W. ¾ N. leads between this patch and Outer shoal, and bearing W. by N. ¾ N. leads southward of it.

Within Outer shoal are depths of from 10 to 12 fathoms, over mud, decreasing gradually to 7 or 6 fathoms, but shoaling suddenly from a depth of 5 to 3 fathoms; when fort Canning flagstaff bears to the northward of N.W. by W. ½ W., caution is necessary in vessels of heavy draught anxious to get as close in as possible. With fort Canning flagstaff to the westward of that bearing the depths decrease more regularly. The outer extremity of the fishing stakes marks the 5-fathoms edge of the shore bank, eastward of Malay point (marked by red lights, page 246).

Buran Darat is the name of an extensive reef of flat rough coral, with occasional patches of sand, which uncovers at about two-thirds ebb, dries 5 feet in places, and fronts the eastern coast of Blakang Mati island, being separated from the shore reef by a narrow channel, with depths of from 4 to 8 fathoms. The reef is about one mile in length in a north-north-east and south-south-west direction, a third of a mile in breadth at the northern end, and terminates in a point at its southern extreme. Chart, 2,023 [2,527].

There is a detached patch with a depth of one fathom over it, and 3 fathoms close around, at about three-quarters of a cable north-westward of the north edge of the reef in the centre of the submarine mine-field; tanjong Teregeh bearing W. ⅜ S. leads northward both of this patch and the shoal off Berhála spit.

Beacons.—The north-eastern extreme of Buran Darat is marked by a stone beacon, painted white, and surmounted by a staff and ball, and the north-western edge by a stone beacon, painted white, and surmounted by an iron cage. Lat. 1° 15½′ N. Long. 103° 51′ E

Malay spit, a mud and sand flat, with several patches of rocks, and which dries at two-thirds ebb, fronts the coast between the Colonial

General chart, 2,403 [2,525].

* Harbour works are contemplated to facilitate landing and embarking goods, &c.

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Chart, 1,095 [2,528]. Var 1° 10′ E.

Government docks and Malay point, projecting in a south-easterly direction to the distance of a quarter of a mile from the point. A considerable portion is being reclaimed as before stated.

Depths of 2¼ to 3 fathoms, the extreme of a horn extending north-eastward of tanjong Pagar, exist at about 3 cables outside Malay spit, with 4 to 6 fathoms between.

Buoy.—A nun buoy, painted red and surmounted by a staff and ball, marks the edge of the 3-fathoms contour line fronting Malay spit, about 1¾ cables E. by S. ½ S. of the north-east corner of the reclamation.

Malay point, composed of low red cliffs, is the south-western limit of Singapore road, and nearly one mile southward of the entrance of Singapore river; tanjong Pagar village lies on the west side of it, and immediately northward of it is mount Palmer, 107 feet above high water.

From a quarter of a mile northward of Malay point, the mud flats have been reclaimed, and a substantial quay, named Telok Ayer, which will have a depth of 18 feet alongside at low water, spring tides, extends the whole way, in almost a straight line for Johnston's pier at Singapore.

Fishing stakes.—Lights.—A line of fishing stakes lies eastward of Malay point, extending in a north-west and south-east direction for 4½ cables, the inner end being 5½ cables off shore. The outer end, in 5 fathoms, is marked at night by a *red* light about 6 feet above high water. A similar light marks the south end of the inner group of stakes, the channel between being half a cable broad; it is reported that these light cannot be relied on.

Lat. 1° 17¾′ N. Long. 103° 52′ E.

Tanjong Rú, the extreme of the land extending 1⅓ miles westward from tanjong Katong, forms the northern shore of Singapore road, and is separated from the western shore of the bay by a channel a quarter of a mile wide, with a depth of about 3 feet at low water, spring tides. There is a police station on the point, and a house on piles about a cable westward of it.

Within tanjong Rú is an extensive shallow lagoon, convenient for the anchorage of boats and native craft, many of which may be seen there at certain seasons.

Buoy.—A buoy painted white and surmounted by a ball, is moored 3 cables westward of tanjong Rú.

Patent slip.—There is a shipwrights yard where repairs to small vessels may be effected and a patent slip 420 feet in length over all, and with 60 feet breadth of entrance.

Tanjong Katong forms the north-eastern boundary of Singapore road. The coast for some distance to the westward of tanjong Katong is low land, and covered with cocoa-nut plantations.

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Obelisk.—An obelisk, which marks the harbour limit in this direction, stands about one cable westward of tanjong Katong, and farther westward is a small iron pier. Chart. 1,995 [2,528]. Var. 1° 10′ E.

Bank.—A detached bank, with depths of from 2 to 3 fathoms over it, fronts tanjong Katong, at about half a mile distant. Fishing stakes exist on it, extending into 5 fathoms water.

This bank will be avoided by keeping mount Serapong bearing westward of S.W. by W. ½ W. until the flagstaff on fort Canning bears W. by N. ½ N.; or by not standing into a less depth than 6 fathoms.

Anchorage.—The trade of Singapore is so considerable that a large number of vessels will always be found anchored in the road within the harbour limits; small vessels may run in, guided by their soundings, and anchor where they can find a convenient berth.

Vessels of deep draught will find good, safe anchorage in from 7 to 10 fathoms water, with the flagstaff on fort Canning between the bearings of W. by N. ½ N. and N.W. ½ N., and with the left extreme of Blakang Mati S.W. by W. ¾ W.

Vessels of War.—The most convenient anchorage for vessels of war and the nearest to the shore, is with the flagstaff on fort Canning in line with Dalhousie obelisk bearing N. 54° W., and the left extreme of Blakang Mati island bearing S.W. by W. ¾ W.; or the obelisk on tanjong Katong N.N.E. ¾ E. In this position there is a depth of 10 fathoms, at about a third of a mile from the 3-fathoms edge of the bank, and about 1½ miles from the landing place.

During the sea breeze, a choppy sea gets up, especially on the ebb, rendering it dangerous for boats alongside.

Foreign vessels of war are berthed after communicating with the Harbour authorities.

Buoy.—To indicate this anchorage, a conical buoy, painted red, and surmounted by a staff and globe, is moored in about 6 fathoms water, within the above position, with fort Canning flagstaff in line with Dalhousie obelisk bearing N. 54° W. This buoy is occasionally dragged from its proper position, but is replaced by the Harbour authorities with as little delay as possible. Lat. 1° 16½′ N. Long. 103° 52½′ E.

Quarantine anchorage.—The quarantine anchorage is about 3½ cables northward of Peak island.

Directions. — From the westward. — When bound to Singapore road from the westward, and having rounded Peak island at the distance of about 2 cables, in a vessel of moderate draught, steer between N. by E. and N.N.E., according to tidal streams, across the Outer shoal, for the anchorage.

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Chart, 1,095 [2,528]. Var. 1° 10′ E.

Vessels of deep draught should haul to the northward round Peak island, and bring it to bear between S. ¼ E. and S. by E., astern, which will lead westward of Outer shoal and the 4-fathoms banks westward of it; when the left extreme of Blakang Mati bears S.W. by W. ⅓ W. (which bearing leads north-westward of Outer shoal), steer as requisite for the anchorage.

In working towards the dangers between St. John islands and Blakang Mati, care must be observed not to bring Peak island to bear eastward of S. by E. while mount Serapong is northward of W.N.W.; but when mount Serapong is westward of that bearing, a vessel may stand on until the western extreme of St. John's island bears S. by W. ½ W.

The shoalest spot on Outer shoal will be avoided by not bringing Peak island westward of S. ¼ E., after the south extreme of Blakang Mati bears W. by S. The fishing stakes will give warning when a vessel is standing towards Malay spit. The south extreme of Blakang Mati, if not brought westward of S.W. by W. ⅓ W., will lead northward of Outer shoal; and large vessels not wishing to stand over this shoal, when outside or southward of it, should not bring Peak island to bear southward of S.W. by S.*

From the eastward.—Small vessels bound to Singapore road from the eastward will have no difficulty, as they have merely to proceed to a convenient anchorage. Vessels of less than 15 feet draught may pass within the banks off tanjong Katong, by keeping in the run of deep water, fairly close to the end of the lines of fishing stakes which extend out from that point.

It is the usual custom for sailing vessels belonging to the port, to keep these banks well aboard when proceeding to the anchorage from the eastward, when the wind is off the land and the tidal stream setting to the westward.

Vessels of heavier draught should keep well outside those banks, and with Mount Serapong bearing S.W. by W. ⅓ W., which bearing leads to the anchorage; or to avoid getting under a depth of 6 fathoms.

SINGAPORE STRAIT—EASTERN PART.

Chart, 2,404 [2,526].

SOUTH SHORE.—The eastern part of Singapore strait eastward of the Sambu islands, is formed by pulo Batam, an island of considerable size lying on the west side of Rhio strait, and by pulo Bintang, a larger island on the east side of Rhio strait.

Lat. 1° 10′ N. to 1° 11′ N. Long. 103° 54′ E. to 104° 0′ E.

BATAM BAY lies close eastward of Sambu island, and is 6½ miles wide, and 2 miles deep, being bounded to the westward by the two Sambu islands, and to the eastward by the peninsula of which Sikwang point is the north-west extreme.

* Approaching from the China sea, *see* page 202.
General chart, 3,543 [3,591].

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The depths in the outer part of the bay vary from 10 to 20 fathoms; but close to the reefs extending from the shores, are depths of 6 to 7 fathoms, so caution is necessary in approaching them. Chart, 2,404 [2,526]. Var. 1° 10′ E.

Three streams fall into the bay: the Mentaru, Ladi, and Jodu; the two latter are separated by tanjong Oma.

Pulo Dongas, on the south shore of Batam bay, lies close to the point situated 1¼ miles eastward of tanjong Pingi; with a coral reef the whole distance between. The bay between this islet and pulo Bokor is free from danger, and vessels may anchor there in about 5 fathoms water.

Pulo Bokor, 4 cables in diameter, lies about that distance off tanjong Liengsi; it is encompassed by the coral reef projecting from the shore, and which extends about 1½ cables beyond it. Lat. 1° 9′ N. Long. 103° 58¼′ E.

Jodu bay is the name of the anchorage eastward of pulo Bokor, and off Jodu and Ladi, two streams. Two small reefs dry at low water, off the entrance of Jodu river, a third of a cable outside the shore reef which fringes the whole coast line from Sikwang point to pulo Bokor, and obstructs the mouths of all the streams.

Vessels should enter the bay with the hill over tanjong Oma bearing about S.E., anchoring in about 5 fathoms water, with pulo Bokor abeam, and about 4 cables distant. The depths decrease suddenly from 7 to 3 fathoms towards pulo Bokor, but more regularly towards the reefs on the opposite side of the bay.

Sikwang point and Tanjong Sengkuwang (Pingir) are, respectively, the north-west and north-east extremes of a peninsula which separates Batam and Bulang bays. The land in the vicinity consists of moderately elevated hills, and the coast line is fringed with coral extending from one cable to 2 cables off, near the edge of which are irregular depths of from 6 to 11 fathoms.

BULANG BAY (Tering bay) is 2¾ miles wide, between tanjong Sengkuwang and tanjong Bekapur, and 4 miles deep. The shore reef extends nearly a mile in places on the west side of the bay with a fringe of mangroves; on the eastern side, where the shore reef extends about 2 cables, there is a depth of 3 fathoms so far as tanjong Samban, and southward of this the bay becomes broader and shallower with drying patches and two low, wooded, islets named pulo Sembakan Besar and pulo Sembakan Kechil. Chart, 2,403 [2,526].

The little rivers, which empty into the bay, are barely navigable for small vessels.

A detached reef, part of which dries 3 feet, lies at the entrance of Bulang bay, with its outer edge situated E. ⅛ N. distant one mile from tanjong Sengkuwang.

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

Anchorage.—The best anchorage in 6 fathoms water, is about a mile south-westward of pulo Nongsa; small vessels may go farther in.

Lat. 1° 12½′ N. Long. 104° 4¾′ E.

Pulo Nongsa, one-third of a mile in extent, consists of two parts connected by a stony ridge which covers at high water, the northern part, rocky and overgrown, is 65 feet above high water; the southern part is a sandy shoal overgrown with low trees; it lies about three-quarters of a mile off tanjong Bela, the nearest point of pulo Batam. The island is surrounded by a reef, extending about a quarter of a mile, between which and the shore reef are depths of 5 to 13 fathoms. A bank, with less than 3 fathoms water over it, extends for about 4 cables north-eastward of the island.

Rosa rock, nearly one mile, E. by N., from pulo Nongsa, and 2 cables northward of the shore reef extending from tanjong Burong, dries at low water, with 10 fathoms close to its north side.

Lat. 1° 12′ N. Long. 104° 6′ E.

Tanjong Burong (Nongsa) is the northernmost point of pulo Batam, and half a mile south-westward of it the Nongsa river, on which is the village of the same name. The channel of this river, between the coast reef which extends northward about three-quarters of a mile from the shore, has a depth of a quarter of a fathom, but inside the river has depths of from one fathom to 1¾ fathoms; there are several villages on this part of the coast. Eastward of the point the shore reef, to the entrance to Rhio strait, projects three-quarters of a mile in places, and is marked by fishing enclosures.

Rhio strait north entrance, lying between tanjong Burong and tanjong Sebong, and the dangers between them, are described on pages 608, 620.

PULO BINTANG is the largest island on the south side of Singapore strait, its north side being about 16 or 17 miles in length, in an east and west direction, the greater part being taken up by Sumpat bay; several dangers lie off the island, which will be described in detail. Like most of the other land forming the strait of Singapore, it is covered with trees, and, excepting the hills inland, is not much elevated.

Within the 10-fathoms contour line the soundings are very irregular, with several shallow patches which are difficult to approach by the lead, but may frequently be distinguished by tidal rips.

Bintang Great and Little hills.—Bintang Great hill is situated about 6½ miles from the northern shore of the island, and may be seen in clear weather from a distance of about 40 miles, being 1,253 feet above high water, and a good mark in approaching the entrance of Singapore strait from the northward. When viewed from that

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direction, it shows a saddle-shaped summit, and appearing to adjoin it on the north side, but in reality 3 miles distant, is a conical hill, named Bintang Little hill (Bukit Kidyang), 792 feet above high water. Chart, 2.403 [2,525]. Var. 1° 10′ E.

Tanjong Pergam lies 1½ miles eastward of tanjong Sebong, and a hill, just inside it, is 298 feet above high water (page 622); the shore reef extends off only a short distance, but a group of islets, or large rocks, half a mile in extent, lies 4 cables off the point. Lat. 1° 11½′ N. Long. 104° 21½′ E.

Pulo Pergam lies half a mile south-west of it with several rocks above water extending nearly a mile beyond.

Lagoi reef (Melang Tekanjong), lying 2 miles north-eastward of tanjong Pergam, is, within the depths of 5 fathoms, about 1½ miles in length in the same direction. There are several shoal patches on it, the least having 1½ fathoms water over it.

Between it and the shore are more shoals, the principal being the Manjang reef, a narrow ridge half a mile in length, with 2¼ fathoms least water.

Pulo Sekerah, well open of tanjong Sebong, bearing S.W. ⅛ W., leads three-quarters of a mile north-eastward of these dangers.

Tanjong Batu Sau (tanjong Sambang), a prominent point on the north coast of Bintang, having a small hill over it, lies 2½ miles eastward of tanjong Pergam. The coast to the eastward as far as Peak islet, is fronted by reef to the distance of one-third of a mile, with several rocks above water. Lat. 1° 12′ N. Long. 104° 23′ E.

Between tanjong Batu Sau and a bluff 2 miles westward, is a bay about one mile deep, its shores being fronted by a reef, with rocks above water, to the distance of about half a mile.

Anchorage.—Small vessels may anchor in about 4 fathoms water in the middle of the bay, avoiding Lagoi and Manjang reefs already described.

Diana shoal lies 4 miles east-north-east from Lagoi reef, and S. by E. ⅜ E. distant 5¾ miles from Horsburgh lighthouse; it is composed of sand and stones, and consists of various ridges, having a general north north-east and south-south-west direction; three patches with 3 fathoms water over them exist on this shoal.

Between Lagoi reef and Diana shoal are several patches, on which not less than 3¼ fathoms has been found, also between Diana shoal and the shore, at a distance of three-quarters of a mile from the latter, are more dangers.

The north extreme of tanjong Brakit bearing southward of E. ¾ S., leads northward of Diana shoal.

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

SUMPAT BAY lies between the point 2 miles eastward of tanjong Batu Sau, with two small hills over it, and the western extreme of tanjong Brakit 8 miles distant. Its head and eastern part is fronted by coral reefs to distances of from one mile to 1½ miles from the shore; the depths in the anchorage are from 7 to 10 fathoms.

Lat. 1° 12′ N. Long. 104° 31¾′ E.

Pulo Sumpat, a rocky, wooded island 178 feet above high water, lying in the eastern part of Sumpat bay, just outside the edge of the shore reefs, may be readily known by its saddle shape.

Two small wooded islets lie on the coast reef eastward of pulo Sumpat, and southward of it, near a small fresh water stream, is Sumpat village.

About a mile to the eastward of pulo Sumpat a narrow creek, named Sungi Beru, extends into the land; it has two villages near the entrance and is navigable for boats at high water, but is soon lost in mangrove swamps.

Dangers.—A rock of small extent, with a depth of 2¾ fathoms over it, lies with pulo Sumpat summit bearing S.E. ⅛ E., distant 2 $\frac{8}{10}$ miles.

A shoal, consisting of sand and stones, and about 4 cables in length in a N. by E. and S. by W. direction, has 1½ fathoms least water over it; this shoalest part lies at the northern end with the north point of pulo Brakit bearing E. by N. ⅓ N., distant 2½ miles.

A small patch, with a depth of 3½ fathoms over it and 6 to 8 fathoms around, is situated with the north point of pulo Brakit bearing N.E. by E. ⅞ E., Bintang Little hill S.S.W. ⅛ W., and north point of pulo Sumpat E. by S. ⅛ S.

TANJONG BRAKIT, the north-east point of pulo Bintang has some hills on its east side, one of which is 217 feet above high water, and others at one mile farther to the southward, with one 267 feet above high water; some trees grow straight up on the point. Reefs and foul ground extend from one mile to 1¾ miles off this point.

Lat. 1° 14½′ N. Long. 104° 34½′ E.

Pulo Brakit, 30 feet above high water, stands on the shore reef, at half a mile north-north-eastward of tanjong Brakit; the reef is here covered with large stones several of which uncover at half tide.

Black rock, dark-coloured, is one-third of a mile westward of the island, on the shore reef, and is visible at high water.

Pulo Kuku, 40 feet above high water, is narrow, and three-quarters of a mile in length; it lies close-to and appears to form the eastern side of tanjong Brakit. For coast southward, *see* page 597.

Postillion reef, composed of coral and sand, with 2 fathoms water over it, lies with pulo Brakit in line with the north point of pulo Kuku, bearing S.E. ¾ E., and half a mile outside the reef extending from tanjong

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Brakit, with depths of 4 to 5 fathoms between. Patches of 4 fathoms extend more than half a mile from this reef in a north-west direction. Chart. 2,403 [2,525] Var. 1° 10′ E.

Brakit rock, one cable in length by half a cable in breadth, has 3 feet least water over it, with depths of 4 to 7 fathoms close-to, it lies N.N.E. ⅔ E. distant 2 1/10 miles from tanjong Brakit. Lat. 1° 16¾′ N. Long. 104° 35¾′ E.

Clearing marks.—The apex of Little Bintang hill well open north-westward of pulo Sumpat, bearing S.W. ½ S., leads westward of the rock. A conspicuous double tree on a hill 4 miles southward of tanjong Lokan, kept well open of tanjong Lokan, bearing S. by W., leads eastward of it; and Barbukit, open about four times its own breadth, northward of Horsburgh lighthouse W. by N. ½ N., leads northward.

CAUTION.—From the above description it will be seen that the whole of the north coast of pulo Bintang is fronted with dangers, and it is advisable that vessels should not attempt to come inside Diana shoal and Lagoi reef; these will be guarded against by keeping pulo Sekerah well open of tanjong Sebong, bearing S.W. ⅛ W., until the north extreme of tanjong Brakit bears E. ⅝ S. Pulo Sumpat, bearing S.S.E., will lead to the westward of the shoals in the vicinity of pulo Brakit.

Tides.—It is high water, full and change, at tanjong Brakit at 11h.; springs rise about 12 feet, neaps 9 feet. (*See* tides, page 598.)

NORTH SHORE OF THE STRAIT.—Aspect.—The north shore of the eastern part of Singapore strait is formed by the south-east part of Singapore island, Johor shoal, and tanjong Penyusuh, the south-east part of the Malay peninsula. The Rumenía islands, with several rocks and dangers near them, together with Rumenía shoals, North patch, and Eastern bank, extend eastward of tanjong Penyusuh nearly as far as the meridian of tanjong Brakit. These outlying dangers will be described in detail; but the following hills, as they form convenient landmarks for navigating the strait, and for recognising the entrance from the eastward, will be first mentioned.

Johor hill or Bukit Lanyut, 661 feet above high water, is of a regular oblong, sloping form, and covered with trees. Standing but a short distance inland from tanjong Johor, the south-west point of the Malay peninsula, it is one of the most conspicuous objects in Singapore strait. Lat. 1° 22¾′ N. Long. 104° 6¼′ E.

Little Johor hill or Gunong Bau, 749 feet above high water, lies about 5 miles northward of Johor hill.

Barbukit, 645 feet above high water, lying 5 miles north-westward of tanjong Penyusuh, is a regular pyramid rising from the low land, and a useful object in making the strait from the northward. Lat. 1° 24½′ N. Long. 104° 12½′ E.

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Chart, 2,403 [2,525].
Lat. 1° 30′ N.
Long. 104° 15¼′ E.
Var. 1° 10′ E.

False Barbukit, 432 feet above high water, and situated near the coast, 6 miles north-north-eastward from Barbukit, is a sloping hill, with a group of trees on its summit, a little more elevated than the coast, which is all rather low and wooded to the northward of the hills over tanjong Penyusuh. It being discernible during hazy weather much sooner than Barbukit, renders it a useful mark when approaching Singapore strait from the northward.

EAST COAST of SINGAPORE ISLAND. — From tanjong Katong (page 246), the north-east limit of Singapore road, the coast trends north-eastward about 5 miles to tanjong Bedok or Meng-kuang; about midway between is the village of Siglap. Just to the northward of tanjong Bedok there is a slight indentation in the coast line, known as Telok Mata Ikan (Fishes' Eye bay).

Red Cliffs.—The south and south-east coasts of Singapore island are level and wooded. The most conspicuous objects are the small Red cliffs (Tanah Merah Kechil), in a small bight just to the south-westward of tanjong Bedok, and the large Red cliffs (Tanah Merah Besar), 3 miles north-eastward of them. The large Red cliffs are visible from a considerable distance to the eastward.

Lat. 1° 23½′ N.
Long. 104° 0′ E.

Tanjong Changi, the north-east extreme of Singapore island, is low land with a white sandy beach, and forms the south east limit of the Öld strait of Singapore.

Red cliff bank is an extensive flat of mud and sand, with some patches of rock and coral, extending from the eastern part of Singapore island, between tanjong Bedok and tanjong Changi; its apex with a depth of 3 fathoms, is 3 miles eastward of the large Red cliffs.

Buoys.—A conical buoy, painted red, surmounted by a staff and basket, is moored in 7 feet water, about 8 cables E. ½ S. from a rock which dries on the Red cliff bank; and a conical buoy, painted white, surmounted by a staff and basket, lies in 7 feet water 3 cables eastward of the red buoy. Small craft approaching Johor channel from the westward should keep pulo Tekong Kechil midway between the buoys, bearing about N. ½ E., which mark leads clear of all dangers southward of them.

Johor shoal fronting the east entrance of the Old strait of Singapore, is about 2 miles in length in an east and west direction, nearly a quarter of a mile in breadth, and composed of hard sand, having 1¼ fathoms least water, and 2 to 3 fathoms elsewhere. Depths of less than 5 fathoms extend about one mile to the eastward, increasing rapidly beyond; near the southern side are depths of from 8 to 9 fathoms.

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Between the west extreme of the shoal and the edge of Red Cliff bank, there are three detached shoals, with depths of $2\frac{3}{4}$, 2, and 3 fathoms over them respectively, and nearly equidistant from each other. Chart, 2,403 [2,525]. Var. 1° 10′ E.

From a depth of $2\frac{3}{4}$ fathoms on the east extreme of the shallow portion of Johor shoal, distant $5\frac{1}{2}$ miles from the east part of Singapore island, Little Johor hill bears N. $\frac{1}{4}$ E., distant about $8\frac{1}{2}$ miles.

Clearing mark.—South Lima island open of South point bearing N. 74° E., or Lazarus island bearing westward of W.S.W., leads southward of Johor shoal. Little Johor hill bearing westward of N. by W. leads eastward of it.

At night, fort Canning light in sight bearing W. $\frac{1}{4}$ S. or more westerly, will lead about one mile southward of Johor shoal.

JOHOR RIVER.—Kwala Johor, the approach to Johor river, is also the eastern entrance of Old strait, and lies between the dangers extending one mile southward from tanjong Johor, and Johor shoal and Red Cliff bank. It is about $2\frac{1}{2}$ miles wide abreast of Johor shoal, with from 11 to 17 fathoms in the fairway, decreasing to 9 fathoms towards tanjong Johor.

Between Red Cliff bank and the bank southward of pulo Tekong Besar the channel is about $1\frac{1}{2}$ miles wide, with depths of from 7 to 13 fathoms; farther in between pulo Ubin bank and the shallow bank eastward of it, the breadth is but three-quarters of a mile, with depths of from 7 to 12 fathoms.

Johor river is navigable, apparently, for vessels of moderate draught in charge of a pilot to Johor Lama, a distance of about 10 miles.

Johor Lama, the old capital of Johor, was once a place of considerable trade, but it has been supplanted by Johor Bahru, the present seat of Government and residence of the Sultan (page 266); it contains about 20,000 inhabitants, chiefly Chinese.

Water.—Good water may be procured here, but nothing else.

Tanjong Johor is the bluff promontory forming the eastern side of the entrance of Kwala Johor, and of the Old strait of Singapore. Lat. 1° 22¼′ N. Long. 104° 5½′ E.

Malang Berdaun, a group of rocks, one of which is several feet above high water, lie about three-quarters of a mile south-eastward of tanjong Johor, within the edge of the bank, which here extends three-quarters of a mile from the coast. Between Malang Berdaun and tanjong Sitapa, $2\frac{3}{4}$ miles east-south-eastward, the bank dries off about 4 cables, and the depths decrease suddenly from 7 to 4 fathoms towards the bank.

Clearing mark.—Little Johor hill, bearing N. $\frac{1}{2}$ W., will lead westward of Malang Berdaun rocks; and South point open of tanjong Sitapa, bearing E. $\frac{1}{8}$ S., will lead to the southward.

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

Pulo Tekong Besar, and Pulo Tekong Kechil, are two islands lying north-westward of tanjong Johor at the entrance of Johor river, dividing that stream into two branches. Pulo Tekong Besar, as its name implies, is the larger island of the two, being 3½ miles in length in an east and west direction, and 2¼ miles in breadth north and south.

Pulo Tekong Kechil, or Little Tekong, lying close to the west side of the larger island, is nearly round, its diameter being about two-thirds of a mile. There is an islet named pulo Sidyongkong lying close to the south-east side of pulo Tekong Besar; and another named pulo Sijahat, consisting of three rocks covered with vegetation, at three-quarters of a mile to the southward of pulo Tekong Kechil.

A rock awash, having 6 fathoms close-to, lies 2 cables north-westward of pulo Sijahat, on the channel edge of the bank which surrounds both the Tekong islands; this bank is "steep-to" in places, and extends 1½ miles southward of pulo Tekong Besar and 2¼ miles northward of it.

Kapala rocks appear to be three rocky heads awash, the outer one lying S. by E. ½ E. distant 1¼ miles from the south point of pulo Tekong Kechil.

Directions.—In proceeding through Kwala Johor, tanjong Changi should be approached bearing N.W. by W., or more westerly, which leads eastward of Johor shoal and of Red bank, in not less than 4 fathoms water, until within one mile of the point; then course should be altered to N. by W. ¾ W., until Johor hill is in line with the eastern Kapala rock bearing E. ¾ S., which mark kept astern will lead into Old strait southward of pulo Ubin. (For Old strait, *see* page 265.)

Should a vessel wish to proceed up Johor river, it would be advisable to obtain the assistance of a pilot.

Calder harbour is the space between pulo Tekong Besar and the mainland eastward of it, northward of tanjong Johor. The breadth of the harbour, between the banks on either side, is three-quarters of a mile, with anchorage in from 5 to 8 fathoms water.

Lat. 1° 20½′ N. Long. 104° 8½′ E.

COAST.—Tanjong Sitapa, lying 3¼ miles east-south-eastward from tanjong Johor, the west extreme of the Malay peninsula, is a somewhat prominent point. The 3-fathoms edge of the shore bank is half a mile distant from tanjong Sitapa and from the shore eastward to South point, and should not be approached under a depth of 7 fathoms.

South point, or Tanjong Tehimpang, the most southern point of this part of the Malay peninsula, lies nearly 4 miles eastward of tanjong Sitapa, with tanjong Tiram between; the 5-fathoms contour line is about half a mile off South point.

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Tanjong Rumenía lies nearly 2 miles eastward of South point; Sungi Kalarang, a small stream, is immediately westward of it. The 3-fathoms edge of the shore bank is rather more than half a mile off tanjong Rumenía, but from the head of the bight, between it and tanjong Penyusuh, it extends 1¼ miles off. Chart, 2,403 [2,525]. Var. 1° 10′ E.

Water island (pulo Rumenía), about half a mile north-eastward of tanjong Rumenía, is a round island, about a quarter of a mile in extent, with an islet off its south-west part connected to it by a reef, both standing on the shore bank. Lat. 1° 21½′ N. Long. 104° 14½′ E.

Diana Cove.—Close westward of the south-west extreme of tanjong Penyusuh, is Diana cove, and three-quarters of a mile north-westward at the head of the bight. Sungi Rumenía is said to have a depth of 2 or 3 feet at its narrow entrance at low water, and to be navigable by boats for 2 or 3 miles, but this is not borne out by the chart.

Water.—There is a stream of fresh water in Diana cove, and water may be procured from Sungi Rumenía during the north-east monsoon, but there are better and more convenient watering-places in the sandy bays on either side of it. Within Water island there is an excellent stream upon the mainland, where fresh water may be obtained with facility in either monsoon; but in the north-east monsoon the eastern streams are more convenient.

Good water can also be procured from the stream close round the rocky point, about 6 cables northward of tanjong Penyusuh.

Tanjong Penyusuh, the south-east extreme of the Malay peninsula, is level land covered with trees, with some small hills behind. Coral reefs extend off from one cable to 3 cables. Lat. 1° 22¼′ N. Long. 104° 17′ E.

Tides.—At tanjong Penyusuh, it is high water, full and change, at 10h. 30m.; springs rise 12 feet, neaps 9 feet.

Tanjong Pungei lies 4 miles northward of tanjong Penyusuh, with a bight between about one mile deep, mostly shallow water, and with outlying dangers, hereafter described. Pulo Pungei lies close southward of the point, and Sungi Pungei within it.

Sitajam point lies about 4½ miles northward of tanjong Pungei, and False Barbukit hill is 2 miles west-south-westward of Sitajam point.

There is a considerable coast and riverside population, and frequent clearings, but the greater portion of the coast is covered with thick forest.

LIMA or FIVE ISLANDS, together with many dangers around and amongst them, front tanjong Penyusuh; they extend nearly 3 miles in a north-north-east and south-south-west direction.

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

CAUTION.—As no advantage is to be gained by venturing amongst the Lima islands, it is best to consider the whole of the space occupied by them as impracticable for ordinary navigation, and to avoid the locality.

Clearing mark. — Tanjong Sitapa in line with South point, bearing N. 88° W., leads clear to the southward of all the dangers near the Lima islands.

Lat. 1° 22′ N. Long. 104° 17¾ E.

Large island, the westernmost and largest of the group, lies half a mile eastward of tanjong Penyusuh ; it is barely a cable in extent, but is conspicuous from being covered with trees. An islet lies about a cable north-eastward of it, both being situated on the same encircling reef.

South Lima, 3 cables south-eastward from Large island, is small, covered with trees, and therefore easily discerned. A rock, 12 feet above high water, lies near its south point, with a reef of straggling rocks, extending to the eastward, which are bold to approach on the south side.

A rock awash lies about 3 cables S.W. of South Lima ; and a patch, on which the depth is 3 fathoms, half a mile east-south-eastward of the rock awash.

Shoals.—A shoal with a depth of 2¾ fathoms over it, the existence of which is doubtful, is reported to lie with Large island bearing N.N.E. distant 1¼ miles. A patch, with 4¾ fathoms water over it, lies one-third of a mile in a south-easterly direction from this position.

Peak rock, a remarkable barren rock, easily recognised, lies 6 cables eastward of Large island. A rock awash lies close north-eastward of it, and patches with depths of 4 and 5 fathoms between Peak rock and Whale rock.

Stork reef is about 3 cables in extent, and from its south-west extreme Barbukit is in line with the north hump of Large island, bearing W.N.W., the latter distant a little more than one mile.

Falloden Hall shoal.—A shoal, with 3 fathoms water over it, exists 6 cables S.E. by S. from Stork reef.

Congalton Skar, a rocky patch with 1½ fathoms water over it, and 8 to 12 fathoms close-to, is the easternmost of the dangers off the Lima islands. From it the middle of Large island is in line with Peak rock, bearing W. ⅜ S., the latter distant one mile.

When the tidal stream is running to the westward, vessels passing through North channel must be careful that they are not set too near this danger, of which the lead will not give timely warning.

Whale rock, about 6 cables north-east of Peak rock, is a small ledge which uncovers at about three-quarters ebb ; it is "steep-to," and the depths around are irregular.

Jones reef, having one fathom water over it, and 8 to 9 fathoms close-to, lies one mile north-eastward of Peak rock.

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North island, very small, but covered with trees, lies 6 cables north-westward from Peak rock; shallow water extends 3 cables northward of it. Chart, 2,403 [2,525]. Var. 1° 10′ E.

North rock, small and barren, lies nearly one mile northward of North island. Lat. 1° 23¼′ N. Long. 104° 18¼′ N.

A reef, about half a mile in extent, and with rocks above water, lies between North island and North rock. There are several patches between it and North island.

RUMENÍA SHOALS are a number of detached patches of sand and coral, stretching in a north-easterly direction from the Lima islands, towards North patch. Between these patches are depths of from 8 to 10 fathoms in places; they are "steep-to" on their eastern and southern sides, there being depths of from 14 to 17 fathoms at a short distance.

Within a depth of 5 fathoms, these shoals extend 2½ miles in a north-north-east and south-south-west direction, and are nearly half a mile wide. The north extreme lies with Horsburgh lighthouse bearing S. by E. ⅓ E. distant 6 miles, and the south-west extreme lies with the lighthouse bearing S.E. ⅔ S. 4⅓ miles. The shoalest spot, with a depth of 2¾ fathoms, over rock, lies near its centre, is about half a mile in extent, and "steep-to" on its south-east and north-west sides.

Rumenía shoals are connected with North patch by a ridge on which the depths are under 10 fathoms, with many isolated patches of 5 fathoms and possibly less water; also between the shoals and the Lima group are similar patches; vessels therefore should pass eastward of this ridge.

A shoal, with 3 fathoms water over it, lies with Horsburgh lighthouse, bearing S.E. ⅜ S., distant 5½ miles, and Large island S.W. by W.

North patch, lying N.E. by N. distant 7½ miles from the shoalest part of the Rumenía shoals, is nearly one mile in length, in a north and south direction, by one-third of a mile in breadth, with depths of 3¾ and 4 fathoms, over mud and sand. From its north end False Barbukit bears W. ½ S. distant 12 miles; and Horsburgh lighthouse S. by W., distant 11¼ miles. Lat. 1° 30½′ N. Long 104° 27′ E

About three-quarters of a mile S. by E. of North patch there is a shoal with 3¾ fathoms water over it.

A shoal, with depths of from 4 to 4¼ fatboms over it, and on which the S.S. *El Kantara* grounded, is reported to lie with Horsburgh lighthouse bearing S. by W. ⅞ W. distant 8½ miles. Lat. 1° 27½′ N. Long. 104° 27½′ E

Clearing marks.—South point just open southward of South Lima island, bearing S. 74° W., leads southward of Rumenía shoals; and Horsburgh lighthouse in line with the west apex of Bintang Great

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

hill, S. 12° E., leads eastward of them, in about 6 fathoms water, and between them and the 5-fathoms patches which lie one mile to the eastward; this track over the ridge is not recommended for other than light draught vessels.

Bintang Little hill, open to the westward of Bintang Great hill, bearing South, leads half a mile eastward of North patch, but near the position of the 4-fathoms shoal, 8½ miles north-north-eastward of Horsburgh lighthouse.

CAUTION.—Mariners are warned that the North channel should not be used for navigation, as no advantage is gained by passing through it, and it is possible that more dangers exist there than are shown on the Admiralty chart.

Eastern bank, the outermost of the known banks off tanjong Penysuuh in the approach to Singapore strait, is nearly 1½ miles in extent, with depths of from 7 to 10 fathoms, and 11 to 14 fathoms close around. It lies about 6 miles within the range of Horsburgh light, which, from its northern edge, bears S.S.W. ⅔ W. distant 14 miles.

PEDRA BRANCA, or White rock, lying in the middle of the eastern entrance of Singapore strait, nearly 8 miles from either shore, is 150 feet in length, 100 feet in breadth, and 24 feet above high water. It will be known by the lighthouse, which was erected on it in 1851, and named after Horsburgh, the celebrated hydrographer, whose labours have in a high degree benefited the interests of navigation and commerce in every part of the eastern seas.

Lat. 1° 20′ N. Long. 104° 24½′ E.

HORSBURGH LIGHT.—On Pedra Branca, a cylindrical, granite lighthouse, 112 feet in height, and painted black and white in bands, exhibits, at an elevation of 101 feet above high water, a *white flashing* light, with a period of system of *ten seconds*, which should be visible, in clear weather, from a distance of 16 miles.

Dangers.—Middle rocks.—A patch with a depth of 4 fathoms over it, and "steep-to," lies 3 cables northward of the lighthouse. Shallow patches extend one-third of a mile eastward of Pedra Branca, and about two-thirds of a mile south-east and south of it. Middle rocks, the southernmost of these, are a little above the surface at high water.

South ledge, visible at about half ebb, consists of three dangerous pointed rocks, with from 8 to 9 fathoms water close to, and 16 to 18 fathoms at a short distance; from the ledge Horsburgh lighthouse bears N. by E. ½ E., distant 2 miles.

A head with 12 fathoms water over it, and from 20 to 30 fathoms around, lies 2¼ miles S.W. by W. ½ W. from the lighthouse, and one of 10 fathoms is charted 5½ miles in that direction; the bottom is irregular between.

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Carter shoal, a coral patch, with a least depth of 3 fathoms at low water, spring tides, on three pinnacle heads covering an extent of about 50 yards in length by 30 yards in breadth, lies with Horsburgh lighthouse bearing N.N.E. $\frac{2}{3}$ E. distant $4\frac{6}{10}$ miles, and Barbukit N.W. $\frac{5}{8}$ W. In addition to the above there are a number of pinnacle heads with 4 and 5 fathoms water over, and 8 to 11 fathoms between, them, and close around the shoal the water deepens to irregular depths of 12, 13 and 20 fathoms.

Chart, 2,403 [2,525]. Lat. 1° 16′ N. Long. 104° 22′ E. Var. 1° 10′ E.

Tides. — It is high water, full and change, at Horsburgh lighthouse and the eastern portion of Singapore strait about 11h. subject to considerable irregularity. *See* Tides, page 240.

Tidal streams.—The velocity of the north-eastern or ebb stream is generally greater than that of the south-western or flood streams in both monsoons; when strongest, it runs from 4 to 4½ knots an hour. Neaps run from 2 to 3 knots an hour, but are very irregular. In the strength of the north-east monsoon, when the current runs from the China sea towards Singapore strait, the south-western stream sometimes runs for 10 or 12 hours at a time.

Again, at about full and change, the north-eastern stream often sets out strong during the night, for 10 or 12 hours together; at other times it is changeable and not strong; it has been sometimes observed to set all round the compass during the night, and once N.N.W. 2 miles an hour directly over Rumenía shoals. (*See* tidal arrows on the chart.)

In making Singapore strait from the northward, vessels should always be prepared to meet with a current running to the southward in the north-east monsoon, and the northward in the opposite season, the strength of which is governed by the strength of the monsoon. In fine weather its rate is usually from 1½ to 2 knots an hour, but the rapidity of the current is also accelerated or retarded by the tidal streams near the coast. Between Horsburgh lighthouse and a position 40 miles to the eastward, it has been known to set at the rate of from 3 to 4 knots an hour.

Masters of steamers running between Singapore and Borneo, state that between Horsburgh lighthouse and Victory island, during the N.E. monsoon, a strong current sets to the southward. In the S.W. monsoon it sometimes sets to the northward, but does not run with the same strength or regularity as in the N.E. monsoon.

This current seems to vary in strength with the monsoons, and is strongest near Horsburgh lighthouse, and gets gradually weaker as Victory island is approached.

Directions.—Singapore road to the eastward.—Having cleared the road, course may be shaped about E. ½ N., and by not

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

bringing the flagstaff on fort Canning to the southward of W. ¼ S. as long as it remains in sight (or the light kept in sight at night), will lead southward of Johor shoal. When Johor hill bears North, the vessel will be eastward of Johor shoal, and may steer for Horsburgh lighthouse, and passing about one mile to the northward of it, proceed into the China sea as convenient.

To work through the eastern part of Singapore strait.—Sailing vessels will experience no difficulty in working in either direction through the eastern part of the strait. The best plan is to keep towards the north shore, in case of having to anchor, as the depths are more convenient on that side. The shore may be approached to depths of 11 or 12 fathoms; South Lima island kept open of South point, bearing N. 74° E., leads southward of Johor shoal, and, when standing towards this danger, if these objects cannot be seen, preserve the depths mentioned, for the shoal is "steep-to."

When eastward of South point keep tanjong Sitapa open of South point, bearing W. ⅛ N., until South Lima island bears westward of North; and, when standing towards Stork reef and Congalton Skar, South point should not be brought southward of W. ¾ S. A vessel may stand towards Rumenía shoals until South Lima island is seen just opening of South point, bearing W. by S. ⅜ S.

There are no dangers on the south side of the strait, excepting those fronting the Bintang coast, and the Crocodile and Pan reefs, &c. But a vessel should not stand so far over as to get near these dangers, for no advantage will be gained by doing so, and the depths there are inconveniently great for anchorage. Pulo Nongsa, lying just to the westward of the entrance to Rhio strait, is very convenient for taking bearings to avoid the dangers in the approach to that strait, and if kept bearing southward of West will lead northward of them all.

From the China sea.—Middle channel, between Horsburgh lighthouse and Rumenía shoals, is the main entrance to Singapore strait from the north-eastward.

The entrance may be easily recognised, if the weather be clear, by Bintang Great hill, a remarkable Saddle hill on Bintang island, and Barbukit, the sharp-peaked hill on the opposite side of the strait. Bearings of these objects will serve to determine the vessel's position when shaping a course to sight Horsburgh lighthouse.

Lat. 2° 26′ N. Long. 104° 32′ E.

Departing from pulo Aor (Vol. II.), steer to bring it to bear about North when disappearing; if the weather be clear, Bintang hill and pulo Aor may be seen together, but this seldom happens. Bintang Little hill, open westward of Bintang Great hill, bearing South, leads eastward of North patch, but near the position of the 4-fathoms shoal, *see* page 259.

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In making the entrance at night, if the vessel's position be known, it will be merely necessary to stand on boldly for the light, making allowance for the set of the stream; and when the light is seen, steer so as to pass about from one mile to two miles northward of it. (*See* Tidal streams, page 261.)

Chart, 2,403 [2,525]. Var. 1° 10′ E.

In hazy weather, having pulo Aor disappearing about North, a course between S. by W. and S.S.W. may be requisite if the north-eastern stream is running out of the strait. The depths will decrease regularly in steering southward, and the low land will probably be seen to the westward when in depths of 18 or 20 fathoms; if so coast it along at 10 or 12 miles distance, until False Barbukit, a low sloping hill, is discerned, appearing like a clump of trees more elevated than the others. When this hill bears W.S.W. a depth of 15 fathoms is the fair track; with it bearing W. ½ S., overfalls in 16 to 13 fathoms may be experienced, or probably less water, being then on about the parallel of the North patch and Eastern bank.

With False Barbukit bearing W. ½ S. if casts of 10, 9 or 8 fathoms be obtained, and being uncertain whether these soundings are near the North patch, or on the shallow part of Eastern bank, haul to the south-eastward until in 14 or 15 fathoms. Then steer South until False Barbukit bears West, when the vessel will be to the southward of Eastern bank, and may haul in W.S.W., when a cast of 10 or 11 fathoms will show that these soundings are on the outer edge of Rumenía shoals.

In doing this the lead must be quickly hove, and if less than 10 fathoms be obtained, haul out directly eastward into depths of 15 or 16 fathoms, and then steer along the south-east edge of the shoals in 16 or 17 fathoms water.

Horsburgh lighthouse should be made, bearing about S.S.W. ½ W., to avoid the 4 fathoms shoal lying 8½ miles N.N.E. of it, and having cleared it and brought the lighthouse to bear S. by W., do not shoal the water under 16 or 17 fathoms towards the southern part of Rumenía shoals; for they are there "steep-to," decreasing from 16 to 12, and from 12 to 3 fathoms at a cast, on some of the patches. South point just open of South Lima island, bearing S. 74° W., leads southward of all the Rumenía shoals.

Sailing vessels should not approach Horsburgh lighthouse within the distance of one mile, as the tidal stream runs strongly, and there is danger of being drifted on to the rock in calms or light winds.

Having passed between Rumenía shoals and the lighthouse, and bound to Singapore road, the course is about W. by S. ⅜ S., taking care, if on the north side of the channel, to have tanjong Sitapa open of South point,

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

bearing W. $\frac{1}{8}$ N. before South Lima island is brought to the eastward of N. by E., when a course about W. $\frac{7}{8}$ S. may be shaped to pass southward of Johor shoal; South Lima island kept open of South point, bearing S. 74° E., will lead southward of it and to Singapore road.

The vessels in the road will be a guide in approaching the anchorage, and as tanjong Katong is neared, the flagstaff on Fort Canning hill should not be brought to the westward of W. by N. $\frac{1}{4}$ N.

With the tidal stream running to the westward it is the usual practice for sailing vessels to keep well over on the north side of the channel, especially in light winds, for, neglecting this precaution, they have often been swept by the rapid current past Singapore road and the St. John islands (the deep water, 45 or 50 fathoms, rendering it difficult or impossible for them to anchor) into the western part of the strait.

Lat. 1° 20′ N. Long. 104° 24½′ E.

At night it is necessary to keep a good look-out for Horsburgh light, which being visible, in clear weather, from a distance of 16 miles, should be in sight before a vessel can get near the dangers at the entrance of the strait.

The light bearing S.S.W. $\frac{1}{2}$ W. will lead about one mile south-eastward of the 4 fathoms patch situated 8½ miles N.N.E. of it, and when about 2 miles distant from the light a W.S.W. course may be shaped until it bears E. $\frac{3}{4}$ N., when keep it on that bearing, astern, until the light on fort Canning at Singapore, which is visible when bearing westward of S. 84° W., comes in sight.

Fort Canning light may be approached when bearing West, until the eastern extreme of Singapore island bears North; from whence the light should gradually be brought to bear to the northward of W. by N., as tanjong Katong is approached.

In the event of fort Canning light not being distinctly made out by the time Johor hill bears N. by E., care is necessary not to shoal the water under depths of 16 or 17 fathoms towards Johor shoal; and if a cast of 12 or 11 fathoms be obtained the course should be altered quickly to the southward, for this shoal is "steep-to," and cannot be approached with safety under that depth.

It is necessary, in a sailing vessel, to observe the precaution of keeping on the north shore of the strait when nearing Singapore road at night, for although a vessel may have entered the strait with a strong north-east monsoon, yet when approaching the road, at night, the wind will generally draw off the land from the north-westward, making it always difficult and sometimes impossible to fetch in or even to get into a convenient depth of water for anchoring.

If bound into the strait of Malacca, when abreast Johor shoal, with fort Canning light in sight, course may be altered to about W.S.W. for

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St. John islands, observing that Raffles light is visible from a distance of about 5 miles eastward of those islands, when bearing westward of S. 66° W., and leads clear of all dangers northward of it. A vessel should steer to pass within a short distance of St. John islands, avoiding the south side of the strait; Raffles light bearing W.S.W. is the fair channel mark. Thence pass that light at a prudent distance, and shape course for Malacca strait. Chart 2,403 [2,525]. Var. 1° 10′ E.

South channel is sometimes convenient for sailing vessels from the eastward which fall to leeward of Horsburgh lighthouse during thick weather, as they have no occasion to anchor outside. If the wind be north-easterly, a sailing vessel may run down until within 4 or 5 miles from the Bintang shore, remembering that Barbukit must be kept four times its own breadth open northward of Horsburgh lighthouse, bearing W. by N. ½ N., or the lighthouse kept westward of W. by N., to clear Brakit rock; then haul to the westward, and pass nearly in mid-channel between the shore and the lighthouse, in from 11 to 13 fathoms of water, avoiding the positions of South ledge and Carter shoal.

With the wind at N.W. or North, it will be advisable to borrow nearer to South ledge than to the Bintang shore, observing not to approach too closely to South ledge, as it is covered at half flood. By borrowing towards weather side of the channel, vessels will be enabled to reach well into the entrance of the strait; and if the wind be scant and the tidal stream adverse smooth water and good bottom for anchorage will be obtained, until the stream is favourable for proceeding to the westward.

North channel lying between Rumenía shoals and the dangers outlying the Lima islands, is about 3½ miles wide, with banks of from 3 to 5 fathoms in the fairway, and it is possible that other dangers may exist than shown on the Admiralty chart. As no advantage is gained by passing through, it should not be used for sea navigation. Lat. 1° 25′ N. Long. 104° 19¾′ E.

OLD STRAIT OF SINGAPORE OR SALAT TEBRAU.

General remarks.—Old strait of Singapore, the channel between the northern shores of Singapore island and the Malay peninsula, was formerly the passage by which all vessels proceeded between India and China, when the Main strait at present in use was not known to be navigable. Its western entrance has very much filled up, even since Horsburgh's time; he gives 3½ fathoms as the least depth, but there is now a bar of sand, with but 2 fathoms water, stretching across from tanjong Gul to tanjong Bulus. The eastern entrance is used by most vessels, usually of light or Lat. 1° 18′ N. Long. 103° 37′ E.

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Chart, 2,403 [2,525]. Var. 1° 10′ E.

moderate draught, visiting Johor; although the channel presents no great difficulty it may be advisable to employ a pilot on a first visit.

Lat. 1° 27½′ N. Long. 103° 45½′ E.

Johor Bahru (New Johor), near tanjong Petri, on the north side and near the middle of Old strait, is the capital of the territory of Johor, and was founded by the present ruler about 40 years ago. It is a flourishing town of about 20,000 inhabitants, mostly Chinese, the seat of Government and the residence of the Sultan, and presents a most picturesque appearance viewed from Singapore on the opposite side of the strait, built as it is along the shore, with the surrounding hills dotted over with bungalows and well laid out gardens.

Facing the sea is the Istana Laut, the principal residence of the Sultan; there are good roads to the interior, an esplanade over a mile in length, airy hospitals, waterworks, wharves, and extensive saw mills, for the purpose of cutting up the timber as it is brought from the adjacent forests.

Communication.—A steam ferry crosses the strait to Woodlands, the terminus of the railway to Singapore, with which place there is also telegraphic and telephonic communication.

Anchorage.—The anchorage, about 2 cables off the town, is in about 9 fathoms water, over mud, with the palace flagstaff bearing N. by W., and the public offices N.E. There is a depth of 5 fathoms within 20 yards of the pier, which is only about 15 feet in length.

Tidal streams.—The tidal streams meet off tanjong Petri, and during the stay of H.M.S. *Hyacinth*, from 20th to 22nd February 1892, the vessels swung twice in 24 hours. The velocity of the stream varied from half a knot to 1½ knots an hour. There were, however, two high waters in the 24 hours.

Eastern entrance.—Sarangong harbour.—The eastern entrance of Old strait is between tanjong Changi and tanjong Kopo on the Malay peninsula (approached by Kwala Johor, page 255), and is divided into two channels by pulo Ubin. The coast within tanjong Changi trends westward for about 1½ miles, when it recedes, forming Sarangong harbour, 3 miles wide. About one mile westward of tanjong Changi is a small river with a few bungalows and a police station near it.

La. 1° 24′ N. Long. 103° 58½′ E.

About 1½ cables westward of Fairy point, the eastern side of Sarangong harbour, are Batu Putih, two white rocks 12 feet above high water, with deep water close to. The depths in the harbour are from 7 to 12 fathoms, decreasing rather suddenly under 6 fathoms.

Several streams discharge themselves into Sarangong harbour, the principal of which, the Sarangong, is at its western extreme, and about one

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mile off the entrance of the river. Pulo Sarangong lies on a mudbank which fronts the coast. Chart, 2,403 [2,525]. Var. 1° 10′ E.

Pulo Ubin is about 4 miles in length, in an east and west direction, and one mile in breadth. A shoal bank extends three-quarters of a mile east, and one mile in a south-easterly direction from its east extreme; there are depths of 4 to 8 fathoms close to this shoal.

Pulo Sikodo, encircled by a reef, lies south of the south-east extreme of pulo Ubin with Papan, a sunken rock, 2 cables southward of it. A 3-fathoms patch lies about 2 cables off shore, south-eastward of Pinang Rawang, and westward of the south point of pulo Ubin is pulo Ketam, with patches of reef extending from both its extremes.

Bentan.—At Bentan, north side of Old strait, westward of pulo Ubin, is a flagstaff and a wooden pile pier. Lat. 1° 26¾′ N. Long. 103° 53¼′ E.

Directions.—Old strait.—Eastern entrance.—The channel northward of pulo Ubin is the better of the two. By keeping within half a mile of pulo Sijahat (a group of three islets) the shoals off pulo Ubin will be avoided. When the north extreme of pulo Tekong kechil bears E. ½ N., course may be altered to pass in mid-channel northward of pulo Ubin; thence keeping to the northern side of the strait, distant about 3 cables, the lead giving sufficient warning if too close. From abreast pulo Khatib Bongsu, keep in mid-channel until abreast Johor Bahru (New Johor).

The navigable channel southward of pulo Ubin is half a mile wide, with depths of 12 fathoms, but the shoals are "steep-to" on either side. The eastern Kapala rock in line with Johor hill, bearing E. ¾ S. astern, leads through in mid-channel to abreast pulo Sikodo and a sunken rock off it. Thence steer, through Sarangong harbour, passing fairly close northward of Batu Putih rocks to avoid the 3-fathoms patch and the mud flat extending off the south point of pulo Ubin.

When the west extreme of pulo Ubin is well open of pulo Ketam, bearing N.W. ¼ W., borrow on the north shore to avoid the bank extending eastward of pulo Sarangong; thence to Ayer Biru, and keep to the north side of the strait as when passing northward of pulo Ubin.

Western entrance.—The western entrance of Old strait has a bar with a low water depth of about 2 fathoms at one mile southward of pulo Merámbon. Within the bar the water deepens to 4 or 5 fathoms eastward of pulo Merámbon.

About 7 miles north-north-eastward of that island is the narrowest part of the strait, and about one mile beyond some rocks covered at high water lie in the fairway.

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Chart, 2,403 [2,525].
Var. 1° 10′ E.

This channel should only be used with local knowledge, as the chart is unreliable.

Lat. 1° 18½′ N.
Long. 103° 38¼′ E.

Beacon.—A stone beacon, painted red and surmounted by a basket, marks the coral patch lying on the east side of entrance, 1½ miles eastward of pulo Merámbon.

Water.—Fresh water may be obtained in several of the streams in Old strait.

General chart 2,543 [3,591].

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CHAPTER V.

WEST COAST OF SUMATRA AND OFF-LYING ISLANDS.

GENERAL REMARKS.—In outward appearance the west coast of Acheh, the northern portion of Sumatra, differs entirely from the east and north coasts. In the latter portions there is a considerable alluvial plain almost all along the coast, with here and there a chain of hills extending nearly to the sea, and with a regular coast line. Chart, 2,760 [2,534]. Var. 0° to 0° 10′ E.

On the west coast there is for the most part a high rocky coast, or if there is a strip of strand by the sea, the land rises rapidly behind it to the neighbouring hills; it is only between Ketapan Pasir and cape Felix, 77 miles south-eastward of it, also southward of the mouth of the Kluat river, which is 53 miles south-eastward of cape Felix, that there is a plain of any breadth on the coast. Lat. 4° 38′ N. Long. 95° 39′ E.

Numerous small streams discharge their waters on the west coast, but most of them are barred, and only navigable by canoes. An almost unbroken chain of mountains extends southward from Acheh head parallel to the coast line, at a distance of from 6 to 8 miles, known as the Barisan or Gunung Itam range; the principal peaks will be mentioned with the portion of the coast adjacent to them.

CAUTION.—The coast line is deeply indented, forming numerous bays, none of which, however, northward of Tapanuli, afford complete shelter during the south-west monsoon. There are many visible and sunken dangers off the coast, but northward of cape Felix, they do not extend to any great distance: southward of that point they extend from 20 to 30 miles off, and, from the incomplete surveys, many dangers no doubt exist that are not charted, so that considerable caution is necessary at all times. Numbers of them are coral reefs, "steep-to," of which the lead will give no notice, requiring a good look-out aleft to be kept during daylight, and to proceed only at moderate speed when in the vicinity of dangers. The use of the lead, however, should not be neglected.

Vessels visiting places on this coast should be on their guard against being surprised by the natives, and never allow armed parties to come on board, nor unarmed ones in any number. (*See* footnote, page 281.)

ROUTES.—General remarks.—The routes along the west coast of Sumatra may be considered as three in number, but the Outer

General charts, 2,760 [2,534] and 2,761.

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Chart. 2,760 [2,534]. Var. 0° to 0° 10′ E.

route only, in the open sea, may be said to be free from danger, as the coast is practically unsurveyed.

For a sailing vessel, the voyage in either direction and at all seasons is long and wearisome on account of frequent calms, but it is generally more difficult to work northward than southward, owing to the prevalence of south-easterly currents, which may be looked for even with and after a southerly wind.

January and February are the best months for going northward, while in September, October, and November, vessels will often be compelled to keep far out to sea in order to make even a little northing; working in shore during these months is almost impracticable. Winds and weather, *see* page 28.

Outer route.—The route to the westward of all the islands, in the open sea, is the best of the three, more especially for sailing vessels and others not intending to touch at any of the west coast ports. South-west and southerly winds often prevail here, when north-west squalls, variable baffling winds, calms, and southerly currents, may be experienced close to the land. A quicker voyage to the northward will thus be made during either monsoon. If touching at any of the ports, they may be steered for when on their parallel.

Middle route.—The Middle route is the space between the chain of large islands, in the offing, and those small islands adjacent to, and interspersed along, the coast, and ranges from 10 to 30 miles distance from the coast of Sumatra. It is frequently taken by Dutch vessels of war, and the coastal mail steamers running between Batavia and Acheh, *viâ* the coast ports.

It should not be followed by a sailing vessel when bound to the northward, nor at any time, if it can be avoided without inconvenience, for although it is wide, and may be adopted by night or day, in vessels of light draught, when the weather is clear and favourable, vessels are more at the mercy of the currents when the winds are light and baffling, and there is no anchorage; in some parts there are dangerous coral shoals, of the approach to which the lead will give no warning.

Inner route.—The inner route is that close along the coast and between some of the islands and dangers off it. It, like the Middle route, should seldom be chosen by sailing vessels bound to the northward in either monsoon; but as there are in many places moderate depths for anchoring, it is preferable in that respect to the Middle route. Vessels visiting many of the ports are obliged to use it, but considerable risk is run when taking this route at night; those using it are generally obliged to anchor at sunset.

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Pilots.—Men possessing some local knowledge are obtainable at Padang, and possibly at other places on the coast, but too much dependence must not be placed on them. Chart, 2,760 [2,534]. Var. 0° to 0° 10′ E.

Tides.—There is but little tide on this coast, the rise being only from 2 to 3 feet, the flood setting northward and the ebb southward. The tidal influence does not extend above 4 miles from the coast. The current is more often south-easterly than north-westerly in the offing; but during the south-west monsoon, it sometimes sets northward for many consecutive days. (*See* Currents, Tides, pages 34–36.)

ACHEH HEAD to RIGAS BAY.—Aspect.—The coast between these two points, about 57 miles apart, is very irregular, and has many prominent headlands, with bays between, none of which afford secure anchorage during the south-west monsoon. The coast is steep and rocky from Acheh head to the north side of Krung Raba bay, beyond which sandy bays occur. Chart, 219 [2,512]. Lat. 5° 34′ N. Long. 95° 16′ E.

In most places the land rises sharply to the hills within; the principal exceptions are the low land in Krung Raba bay, which continues through the kloof or cleft into the Acheh valley, also the valley of the Lambesoi river, 25 miles to the southward, and between Gle Eh Manuk point and Jinamprong, which forms a conspicuous break in the Barisan range. Lat. 5° 28¾′ N. Long. 95° 15¾′ E. Lat. 5° 4½′ N. Long. 95° 20′ E.

Population.—The coast is thinly populated owing to the frequent wars and the prevalence of fever, consequently only a few villages exist; the pepper cultivators live further inland.

General directions.—Numbers of sunken dangers lie near the coast, rendering it advisable to give it a berth of 5 or 6 miles, especially at night. Most of the dangers are "steep to," as is the coast in most places, but they are generally seen by the surf breaking over them. There are numerous prominent headlands and mountains by means of which the vessel's position is easily ascertained. Near the shore, the bottom is sand, or sand and coral; near pulo Raja it is sand and mud, or mud, in depths of 8 fathoms and beyond.

The indifferent bottom almost everywhere, and the heavy ocean swell, and poor shelter from westerly winds, renders most places on this portion of the west coast undesirable anchorages, and vessels must be ready to leave them at any moment.

Landmarks.—Mountains.—The following mountain tops may be recognised and are useful marks when navigating along this coast.

Gle Raja, the summit within Acheh head, has been referred to on page 67.

Gle Karang, 408 feet above high water, is easily recognised; it is situated on the tongue of land forming the north side of Riau bay. Lat. 5° 16′ N. Long. 95° 15½′ E.

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Chart 219 [2,512]. Lat. 5° 14½′ N. Long. 95° 16¾′ E. No variation.

Green hill (Kruet), a conspicuous green hill, 1,037 feet above high water, with a bare round top, is situated on the tongue of land separating Riau and Lehong bays.

Lat. 5° 14½′ N. Long. 95° 31′ E.

Batu Mukurah or Chupeh, 6,371 feet above high water, is a sharp peak 15 miles within Green hill. Gunong Puchit Puding, 6,220 feet above high water, is the highest and southernmost point of the ridge whose spurs extend to the sea at Riau and Sidoh bays. The mountain is precipitous on the south side, and is usually to be distinguished at night if close in.

Lat. 5° 6½′ N. Long. 95° 20′ E.

Timbaga or Tembaga hill, a truncated cone 856 feet above high water, is a good landmark; it lies on the north side of Daya bay and descends steeply to the sea. There are many caves in the hill containing edible birds' nests. Southward of Timbaga hill is a low ridge of hills, which when seen from the southward appears as a sharp-peaked hill.

Lat. 4° 55½′ N. Long. 95° 26′ E.

Raja hills are two hills close together; the westernmost and higher of the two is 1,870 feet above high water. Bukit Medang, 886 feet above high water, is the summit of a promontory in Raja bay.

Chart, 2,760 [2,534]. Lat. 4° 41′ N. Long. 95° 33′ E.

Gunong Kwali, 1,310 feet above high water, just northward of Rigas bay, is a good landmark, and visible in clear weather from a distance of 40 miles. From the south-eastward it appears as a cone, with a few peaks westward of it; from the north-westward two summits will be seen, the northernmost being the lower. Its south-east side is cleared, and looks like cultivated land.

Lat. 4° 43′ N. Long. 95° 39′ E.

Gunong Sikawit, 3,225 feet above high water, about 8 miles within Rigas, appears as two peaks, rising high above the intervening hills, when abreast it.

Singa Mata, about 35 miles from the coast, is 5,151 feet above high water, and the summit of an inland range (mountains, continued on page 285).

Chart 219 [2,512].

COAST.—King point, or Ujong Raja, about 3½ miles southward of Acheh head (page 68), is a lofty promontory rising precipitously from the sea, and easily recognised from all directions; there are depths of 12 fathoms at a short distance from it. Sailing vessels bound through Surat passage will find temporary anchorage here, should the wind and current be unfavourable. There are two coves between King point and Acheh head which afford good anchorage for small craft.

Plan, 2,284 [2,535]. Lat. 5° 28¾′ N. Long. 95° 15¾′ E.

KRUNG RABA BAY, 2½ miles southward of King point, is about 4 miles wide; the mountains on either side make it appear as a valley when a considerable distance off, and it has been mistaken for Surat passage.

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Krung Raba river discharges into the bay by three mouths, the southernmost of which is at times available for boats, but there is always a considerable surf. A coral reef half a mile wide and 1½ miles in length, fronts these mouths and the coast northward; and there is a coral patch with a depth of 3¼ fathoms, on a continuation of the reef, at 3 cables off the cove in the northern part of the bay. Charts, 2,284 [2,535]; 219 [2,512]. No variation.

Anchorage.—The bay affords anchorage during the north-east monsoon, in about 12 fathoms water, over sand and coral. Some rocks above water lie about 2 cables off shore with ujong Ritieng bearing S.S.W., ⅓ W., distant 1½ miles.

There is also good anchorage in the cove in the northern part of the bay, within the reef, in a depth of about 7 fathoms; a conspicuous tree at the head of the cove, bearing E. ¾ S., leads in northward of the reef.

Ujong Ritieng is a precipitous headland with a rock above water close off it and depths of 12 fathoms just beyond. The village of the same name is situated on the creek southward of it.

Barba and Lepong are the shallow extremes of the passage within the island close to the shore, southward of ujong Ritieng.

SIDOH, or Sedu bay, 5 miles southward of ujong Ritieng, is about half a mile in extent, and entered eastward of Sedu point: a coral reef, with rocks awash on it, extends nearly 3 cables off the western side of the bay, and the eastern side is foul for a distance of nearly a cable. Plan, 2,284 [2,535]. Lat. 5° 20¾′ N. Long. 95° 15¾′ E.

Anchorage.—There is good anchorage in 7 fathoms water, over mud, with Sedu point bearing W. by S. ⅛ S., distant about 2 cables, but vessels must be prepared to leave this at any moment; the bay also affords fairly good anchorage for small craft in a depth of 3 fathoms.

Batu Mandi is a group consisting of three rocks above water, situated about one mile S.W. ½ W. of Sedu point; there is a depth of 10 fathoms in the passage, about 3 cables in breadth, between these rocks and some rocks above water extending off the shore nearly abreast. Chart, 219 [2,512]

Amboina bay (Lok Paroi), about one mile in extent, affords anchorage in from 5 to 6 fathoms water, but is open to the westward. A small reef extends off the point on the south side of it.

Perling rocks, above water, extend about one mile off shore at the same distance southward of Amboina bay, with depths of from 7 to 10 fathoms inshore of them. Two of the rocks have trees growing on them, and the largest rock is known as Batu Buja.

OUTLYING REEFS.—Aart van Nes, a coral patch with 6 fathoms least water over it, and about 10 fathoms around, lies in the

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Chart,219 [2,512]. Lat. 5° 26¼′ N. Long. 95° 11½′ E. No variation.

offing abreast Krung Raba bay, with ujong Ritieng bearing E. by S., distant nearly 5 miles.

Cuhurn reef, about 6 miles southward of Aart van Nes, has a least depth of 7½ fathoms, and from 10 to 20 fathoms around, with Sedu point bearing E. by N. ⅛ N., distant 3¾ miles.

Sindora reef, a coral patch about one mile in length, north and south by half a mile in breadth, with depths of 5¼ to 7 fathoms over it, is "steep-to," there being 30 fathoms close to on its western side and 11 to 15 fathoms on the north and east sides. From the shallowest spot near its south extreme, pulo Rusa bears S.E. ¾ E., distant 4¼ miles, and Sedu point N.E. by E. ½ E.

Plan, 2,284 [2,535]. Lat. 5° 15½′ N. Long. 95° 14½′ E.

COAST.—Rusa island, 300 feet above high water, is about one-third of a mile in extent, and situated about the same distance off the north-west point of Riau bay; there are two patches, with about 6 feet water over them, in the channel between, and a similar patch just off the south extreme of the island. The island is thickly wooded, has a jagged coast-line, and there is sandy beach on the south-west side, where near a group of cocoanut trees, landing may be effected at times.

Anchorage.—There is anchorage in the channel within, avoiding the rocks mentioned, and which will usually be marked by breakers; the Rusa shore should be kept, where there is a depth of not less than 6 fathoms. Buga point, abreast, on the main island, is a precipitous black and rocky promontory, 685 feet above high water, and forms the north-west side of Riau bay.

Reef.—A reef, which breaks, is situated 1$\frac{8}{10}$ miles to the westward of Rusa island.

RIAU BAY (Lok Blang Raja), about one mile in extent, affords exposed anchorage in 7 to 8 fathoms water, over sand; there are small villages on the shores of the bay. There is usually considerable surf in the northern part of the bay, and the best landing is then in the south-east corner.

Lat. 5° 14′ N. Long. 95° 16¼′ E.

Tiba point, the south extreme of the bay, is a rocky promontory and a spur of Green hill (Kruet), 984 feet above high water (mentioned on page 272), and separates Riau bay from Lehong bay.

A coral patch, with 9 fathoms water over it and depths of 16 fathoms around, is situated in the offing, with Rusa island bearing N.E. by E. ⅛ E., distant 5¾ miles.

Lehong, or Loöng bay, is 1½ miles in breadth between Tiba and Puderut points and three-quarters of a mile deep, with depths of from 5 to 8 fathoms.

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Rock.—A rock, with one fathom water over it, which seldom breaks, is situated N. ¾ W., distant 2 cables from Puderut point. Between the rock and the point there are depths of from 7 to 8 fathoms, and there are no other dangers in the bay more than 50 yards off shore. Chart. 2,284 [2,535]. No variation.

Anchorage.—The bay is exposed to westerly winds, but affords anchorage during fine weather, in 5 fathoms water, with Puderut point, the rocky headland forming its south point, bearing S.W. ⅛ W. and eastward of the rock above mentioned.

Tanjong Puding, 2½ miles southward of Puderut point, is a low headland with a reef extending about half a mile off it; Rusa island, open of Puderut point, bearing N.W. by N., leads seaward of it in a depth of 8 fathoms. Sidagung point to the southward of tanjong Puding, is a steep and rocky point with depths of 7 fathoms close-to. Chart, 219[2,512].

KLUANG or KELUANG BAY affords anchorage for small craft, in about 7 fathoms water, eastward of the island; but is open to the north-west, and there is considerable swell here during the south-west monsoon, rendering it, with strong winds, an undesirable anchorage. The bay is sandy on its south and east shores, and Keluang village lies on the banks of the Lamtui creek. Plan, 219 [2,512]. Lat. 5° 6′ N. Long. 95° 19′ E.

Water.—Drinking water of indifferent quality is obtainable.

Pulo Kluang, a rocky islet about 300 yards in length, 375 feet above high water, with tall trees, is inhabited. A remarkable cave exists in the island containing quantities of edible birds' nests. There is a passage 2½ cables wide between the island and the main, with depths of 6 to 8 fathoms; the island shore should be kept by vessels using it.

Daweh point, a narrow and precipitous tongue of land terminating in two headlands, separates Kluang and Daya bays; there is deep water off the headlands, but the coast between them is fronted by a reef.

Batu Burung consists of several rocks above water on a reef half a mile in diameter and nearly dry at low water, which lies 2 cables off the southern headland of Daweh point; there are depths of from 14 to 16 fathoms between it and Daweh point and, if using this passage, the main island shore should be kept on board. Chart,219 [2,512]. Lat. 5° 6′ N. Long. 95° 18′ E.

Daya bay, between the south side of Daweh point and ujong Po, is about 2 miles in extent and open to westerly winds. Timbaga hill, 856 feet above high water, mentioned on page 272, descends precipitously to the sea on the north side of the bay. Daya village is on the east side with the river just southward of it, but this river, formerly a mouth of the Lambesoi, is closed by a sand bank 10 feet high.

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Chart,219 [2,512]. No variation.

Ujong Po is lower than Daweh point, but may be recognised by a small, round green hill at its extreme, which appears as an island from the offing. There are some rocks above water close off it on which the sea constantly breaks.

Anchorage.—The best anchorage is in 6 fathoms water, over sandy bottom, with ujong Po bearing S. $\frac{1}{8}$ E. and Kwala Daya S.E. $\frac{1}{8}$ E.

Coast.—Gli Eh Manuk, the southern extreme of ujong Po, is rocky; and thence to Lambesoi bay the coast is fronted by a coral bank to the maximum distance of half a mile.

Plan, 2,284 [2,535].

LAMBESOI BAY, between Lambesoi river and Karang point, is about $2\frac{1}{2}$ miles broad and one mile deep.

The Lambesoi, Lubuk and Unga rivers discharge into the bay, and have villages at their mouths; the first mentioned only is of any importance, and it is the largest on this portion of the coast. It rises in Bukit Mukurah (page 272), and is navigable for craft of 4 feet draught for about 4 miles. A bank of stones, dry at low water, extends off the western point, rendering it necessary, when entering, to approach the entrance from the eastward and hug the east point.

Lat. 5° 0¼′ N. Long. 95° 22½′ E.

Limpang island, a rocky islet with precipitous sides of red rock and crowned by thick foliage, is easily recognised; it stands on the reef which surrounds Karang point to the distance of half a mile.

Dangers.—Lambesoi reef, off the north side of the bay, is, within the depths of 5 fathoms, $1\frac{8}{10}$ miles in length in a north and south direction, with a greatest breadth of half a mile. The least depth of 2 fathoms near its northern end always breaks, and it has from $2\frac{1}{2}$ and 3 fathoms water in places; the south extreme lies W. by N. $\frac{1}{2}$ N., distant $1\frac{8}{10}$ miles from Limpang island.

Palintak reef, with a least depth of $2\frac{1}{4}$ fathoms, is about 4 cables square and lies about a mile south-south-eastward of the mouth of Lambesoi river.

About 4 cables southward of the mouth of Lambesoi river there is a rock with less than 6 feet water over it, and with a depth of $3\frac{1}{4}$ fathoms lying 2 cables north-west of it.

Anchorage.—The bay offers but indifferent anchorage, the bottom being sand or rock and the depths irregular; the seaward reefs, nearly 3 miles off shore, also do not break the sea, and the streams from the rivers cause a vessel to lie broadside on and therefore to roll heavily. The best position is in 7 fathoms water, between Palintak reef and Lambesoi reef to the westward.

Directions.—When entering, Limpang island should be steered for, bearing E. $\frac{1}{8}$ N., until about one mile from it, or the mouth of the

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Lambesoi bears about N. ½ E., when it should be steered for, anchoring abreast or a little northward of Palintak reef, which with the northern part of Lambesoi reef always breaks. Chart, 2,284 [2,533]. No variation.

There is said to be a passage from the northward within Lambesoi reefs, with a depth of not less than 6 fathoms, on the line of Limpang island in the saddle between the Raja peaks, bearing about S.E. ¾ S., but this is apparently not borne out by the chart. Mount Karung, the hill close eastward of pulo Rusa, open of Daweh point, bearing about N. by W. ¾ W., leads westward of Lambesoi reefs.

Coast.—Baba Awi bay lies between ujong Subang and ujong Bangka, which are 3½ miles apart. The shore is skirted by a reef all round, and there are three reefs in the bay. Chart, 219 [2,512].

Subang reef, half a mile in extent, with a least depth of 2 fathoms over it, lies about one mile south-west of the low point of the same name, with pulo Limpang bearing N. ¾ E. distant 1¾ miles. Mount Karung, open of Daweh point, bearing about N. by W. ¾ W., leads westward of it, as well as of Lambesoi reefs, and the east extreme of pulo Raja in line with ujong Bangka, S. by E. ½ E., leads in 7 fathoms water, between the reef and that fronting the shore. Lat. 4° 58½′ N. Long. 95° 22′ E.

A detached reef lies with its western extreme nearly one mile off Jinamprong, the middle point of the bay, with a passage between it and the reef fronting that point.

Ujong Bangka, the south-west extreme of the bay, is low, with a coral reef extending a few hundred yards off it and also from the shore eastward and southward of it. Lat. 4° 56′ N. Long. 95° 23′ E.

Anchorage.—Baba Awi bay is open to westerly winds, but affords some protection for small craft from south-west winds off Baba Awi village, in 5 fathoms water, over mud.

Baba Parot reef is one mile in length, east and west, by half a mile in breadth, with a least depth of 2¼ fathoms, from which ujong Bangka bears E. ¾ S. distant 1½ miles; it breaks with the least swell. There are depths of 14 fathoms between it and the point, and Baba Nipa point in line with the east extreme of pulo Raja bearing about S.S.E. leads in the fairway. To pass westward of the reef, keep Green hill open of Daweh point, bearing N. by W. ¼ W.

Noh point is low, and situated about 2 miles southward of ujong Bangka. On the coast reef which extends half a mile from the shore there are some rocks above water; between the points, at half a mile off shore, are two others above water, on which the sea breaks. Noh village lies eastward of the point.

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Chart, 219 [2,512]. No variation.

RAJA BAY or TELOK KRUT.—This bay, over 1½ miles in extent, lies between Medang hill and pulo Raja and is one of the safest on this coast, with good holding ground in depths of from 8 to 10 fathoms, but open to the north-westward. With these winds vessels can run through Raja strait and anchor under the lee of pulo Raja. The bay is fronted by a coral reef to a short distance which extends farthest off under Medang hill, with rocks above water on it in places. The Charakman creek discharges southward of the hill.

There are two villages in the bay, Telok Krut, on the south-east side, being the most important pepper port on the west coast of Sumatra.

Pulo Raja is 1½ miles in length, in an east and west direction, by half a mile in breadth, and thickly wooded, with its summit about 310 feet above high water.

A reef surrounds the island to the distance of half a mile on its west side, and there are rocks above water on that side and on the south side; these are "steep-to." Pulo Maneh, 42 feet above high water, a yellow sandstone rock with a wooded summit and some cocoa-nut palms, is situated on the reef at the north-west extreme of the island.

Plan, 2,760 [2,534]. Lat. 4° 50¼′ N. Long. 95° 24′ E.

The Dutch station and fort are situated on the east side of pulo Raja, in Raja strait, southward of Batu Keramat, the north-west extreme of the island. The graves of the Telok Krut chiefs are at Batu Keramat.

Communication.—There is communication every fortnight by the Netherlands Royal Packet Company's steamers between Batavia, Padang, Penang, and Singapore, calling at a number of intermediate ports. *See* Chapter I., page 21.

Supplies of fresh provisions and water, in small quantities, may be obtained.

Pier.—An iron jetty 60 yards in length extends from the Dutch station.

Anchorages.—Anchorage may be obtained off the pier in 7 to 9 fathoms water; and there is good holding ground farther northward in a depth of 9 fathoms, off Lok Sirun village, with the east point of pulo Raja S. by E. ⅛ E., and pulo Maneh S.W. by W. ¾ W. With north-west winds the best anchorage is about half a mile southward of the Dutch station, in a depth of about 8 fathoms, under the lee of the island. There is also good anchorage in 10 fathoms water between pulo Raja and Baba Nipa point.

Raja strait is about 5 cables in length and 3½ cables in width, but the navigable channel, on the west side, is narrowed to about 1½ cables by a

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bank extending about 130 yards north-eastward of pulo Raja, and rocks, the north and south of which are nearly awash, lying near the centre of the strait, the northern one being nearly abreast tanjong Krut, the southern 1½ cables farther southward. There are no other dangers beyond the shore reef on either side, which extends but a short distance. Plan, 2,760 [2,534]. No variation.

Buoys.—The northern and southern rocks in the fairway are marked on the west side by two nun buoys painted black, but they are not to be depended on.

Directions.—To proceed through the strait keep about a cable from the island shore, with the little cone hill on the east slope of Timbaga hill in line with Noh point, bearing about N. by W. ½ W., on which line there is not less than 7 fathoms.

Tides.—The rise and fall of tide is very slight.

COAST.—Baba Nipa point, 3 miles south-eastward of pulo Raja, may be recognised by its yellow, gray, precipitous sides and the rock above water close off it. The bottom is foul and irregular off the point, causing heavy rollers during strong winds. Timbaga hill touching the east side of pulo Raja, bearing N. by W. ½ W., leads seaward of all dangers. Chart, 219 [2,512]. Lat. 4° 48½′ N. Long. 95° 25½′ E.

Merak point to the southward of Baba Nipa is low and clear of danger, but there are rocks above water off the coast between; eastward of Merak point a reef extends about 2 cables off-shore.

Water.—About a mile to the eastward of Baba Nipa point is the river and village of the same name; good drinking water may be procured.

Pati point, 2 miles southward of Merak point, has a long green hill with scattered cocoa-nut trees on it. A reef extends about half a mile off it and off the bight northward, on which is Keheh, or Kechil islet covered with thick foliage, with rocks above water north-west of it. Pati village lies within the point.

PULO KAS is a high, rocky, thickly wooded and desert islet, one mile in length, in a north west and south-east direction and 4 cables in breadth, situated half a mile south-westward of Pati point. Its west side is "steep-to," but the east and south sides have a coral reef half a cable wide with 6 fathoms close-to. Chart, 2,760 [2,534]. Lat. 4° 45½′ N. Long. 95° 27′ E.

Anchorage.—The anchorage eastward of pulo Kas is considered one of the best on this coast during the south-west monsoon. A good position is in 7 fathoms water, with the south point of the island bearing S. by W. ⅝ W., distant about half a mile, and the summit of pulo Raja in line with the west slope of the wooded part of Baba Nipa point.

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Chart, 2,760 [2,534].
Lat. 4° 41′ N.
Long. 95° 30′ E.
No variation.

COAST.—Gunong Malin is the hilly coast point 4 miles south eastward of pulo Kas; a reef, "steep-to," extends half a mile off, with rocks above water on it.

Pulo Pejaba are two rocky, desert islets with a few trees, and encircled by a reef. About 2½ cables south-west of the western islet is a rock 17 feet above high water, "steep-to" on the west side, and between this rock and the island are three rocks above water. About 3 cables S. by E. ⅛ E. from the Pejaba islets is a sunken rock nearly awash, with depths of 11 fathoms around; there are two sunken rocks between this rock and the islets.

Pulo Klung, or Plieng, lies eastward of Pejaba islets and 2 cables off the coast abreast Lagen. It is higher than the Pejaba islets, being 394 feet above high water, and is thickly wooded, but uninhabited. There are depths of 10 fathoms between pulo Klung and the Pejaba islets and about 3 fathoms between pulo Klung and the coast.

Telok Klumpong lies within the point of the same name, which is a narrow precipitous tongue of land crowned by a green hill with a few scattered trees on it. A reef extends eastward from the point for 1½ cables, and to a distance of three-quarters of a cable off shore. A rock above water, overgrown with vegetation, lies half a cable south-west of the point. The village is an important place for the pepper trade.

Anchorages.—There is temporary anchorage in a depth of 6½ fathoms off the village with the point bearing W. by S. ⅛ S.; but the bay being open to winds between S.W. and N.W., vessels must be prepared to leave it at any moment. Good anchorage may be obtained between pulo Klung and Klumpong, in 9 fathoms water, over sand and mud, with some slight protection from north-west winds. Sailing vessels should moor with open hawse to the north-west, and there is not much room to drag.

Pulo Chikem (Pirling) are two islets situated one mile southward of Klumpong point. The larger and eastern is high and steep, with a coral reef with rocks above water in places, extending 2 cables northward and southward of it. The western islet is "steep-to" on its seaward side.

Batu Broh, three bare rocks about 10 feet above high water, lie between pulo Chikem and the Sumatra coast, with a reef on their eastern side. There is a depth of 3¾ fathoms between them and pulo Chikem.

Pulo Ranoi, lying a few yards off Ranoi point, is a mass of rock 56 feet above high water, with a wooded summit, and presents a great contrast to the coast, which is low, sandy, and wooded from Klumpong point to abreast it. A reef fronts the shore between Ranoi and Rigas points to the distance of 3 cables, with rocks above water in places.

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Karang Angkatan, or Gillis reef, with a least depth of 2 fathoms over it and 10 fathoms around, is about 50 yards in extent and seldom breaks; from it tanjong Rigas bears S.E. by E. $\frac{1}{8}$ E. distant $1\frac{1}{2}$ miles. Plan, 1,701 [2,533]. No variation.

Baba Nipa point open westward of pulo Kas, bearing about N.N.E. $\frac{1}{2}$ E., leads westward of it. Raja hills in line with Klumpong point leads eastward of it, and Kuali hill in line with Ranoi leads southward of it.

Tanjong Rigas, the south-west extreme of the peninsula within which is Rigas bay, is a rocky headland rising steeply from the sea, covered with vegetation, and higher than the land within it. Some hill tops near it are thickly wooded, others are green and cultivated. Lat. 4° 39½′ N. Long. 95° 32½′ E.

Pulo Rangas, lying about $1\frac{1}{2}$ miles south-westward of tanjong Rigas, is a small rocky island 59 feet above high water and covered with trees, which are visible for a considerable distance. A reef, with 16 feet water over it, extends about one cable off its north-east side; two rocks above water lie off its south-east side, and a sunken rock, which always breaks, lies close off the north-west side, all of which are "steep-to."

A rock, 3 feet above high water, lies east-south-east, distant 4 cables, from pulo Rangas.

Anchorage.—There is fine weather anchorage all round the island in depths of about 12 fathoms, and small vessels may find shelter, during north-west winds, in the same depth, with the north-east extreme of the island bearing W. $\frac{3}{4}$ N. distant about one cable.

RIGAS BAY (Lo Rigaih), between tanjong Rigas and tanjong Lo Jahu, is nearly 2 miles wide, and about the same deep; the coast is for the most part composed of rocky cliffs, excepting the swampy portion on its north east side. The four islands which encumber it divide the bay into the north and south harbours. Krung Rigas river runs into the northern part of the bay, and southward of its mouth is Lo Timong village.

South harbour, the larger of the two, is used by all but small craft, being about half a mile in extent, with depths of 5 to 6 fathoms, over sand and mud, and easy of access. It is open to the south-west monsoon, rendering it advisable to moor, but Lo Eh Kabi, a bight on the south-east side of it, about 3 cables wide, affords fair shelter even at that season.

The north harbour has depths of from 3 to 4 fathoms over a breadth of $1\frac{1}{2}$ cables, and is used by small trading craft; it affords fair shelter at all seasons, and being abreast the town of Rigas is much more convenient than the south harbour.

Vessels making any stay at Rigas bay are recommended to moor between pulo Reasam and Reasam rock, where there are depths of

General chart, 2,760 [2,534].

The crew of the S.S. *Hok Canton* were overpowered by the natives when at anchor off Rigas June 1886, and most of the Europeans murdered.

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Chart. 1,701 [2,533]. No variation.

9 fathoms over sand and mud; as the harbours are notorious for marsh fevers, and the exhalations from the extensive coral flats which partly dry and nearly surround them give rise to an intolerable stench. The distance from this anchorage to the town is not greater than from the south harbour.

The town of Rigas is one of the principal places for the collection and export of pepper. No supplies are obtainable, there being only sufficient for the inhabitants; the drinking water is bad.

Lat. 4° 39′ N. Long. 95° 33½′ E.

Islands and Dangers.—Pulo Reasam, the largest islet, is about 4 cables in length, in a north and south direction by 2 cables in breadth inhabited; and with the exception of the east side it is steep, rocky and wooded; on the east side there is a flat portion covered with cocoa-nut trees. A reef surrounds it to distances of from one cable to 2 cables, except at its south extreme and a small part of the north coast.

Pulo Anggang, eastward of pulo Reasam, and pulo Pengaseh and pulo Semut within it, are low rocky islets covered with trees and brushwood and uninhabited; they are all situated within the edge of the irregular coral reef, with depths of less than 3 fathoms, and dry in places, which fills the inner half of the bay.

Two reefs with depths of 13 and 17 feet lie about 3 cables southward of pulo Reasam, and between them and the island there is a shoal with 13 feet water over it. Pulo Semut open south-eastward of pulo Anggang, bearing N.N.E. ¼ E., leads eastward, and tanjong Rambong open westward of pulo Reasam, N. ⅞ E., leads westward of them.

Reasam rock, above water, with depths of about 10 fathoms close-to, lies between Reasam and Rangas islets, W.S.W., distant 8 cables from the south point of the former; a patch with 2½ fathoms water over it, lying 2 cables north-north-westward of Reasam rock, is also "steep-to." The north shore between Rigas and Rambong points is fronted by a reef to the distance of one cable to 2½ cables, with two off-lying patches.

Tanjong Lo Jahu and Batu Tenga, the high and rocky promontories covered with trees, on the southern shore, are "steep-to" and 546 and 359 feet respectively above high water. Batu Tenga village is situated on the point of that name, and that of Chalang in a sandy bay on the east side of the peninsula.

Pasir islets consist of two groups of uninhabited islands, situated about three-quarters of a mile south-westward and southward of tanjong Chalang. The western group consists of four rocky islets of which Pasir Besar is the southernmost and largest; it is surrounded by a reef extending one cable from the western side, with a rock above water on it.

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Two rocks above water lie 3½ cables south-west of Pasir Besar, with a depth of 10 fathoms between them and the island. Chart, 1,701 [2,533]. No variation.

The remaining three islands of the group lie close northward of Pasir Besar on a reef joined to it; northward of this reef there is a depth of less than 3 fathoms, and a rock above water lies midway between the reef and the south extreme of tanjong Chalang.

A small rock with a depth of 11 feet over it is situated with the east extreme of Pasir Besar, bearing S. ¾ W., distant 3½ cables.

Pasir Kechil, the northernmost and largest island of the eastern group, which consists of three islands, is a bare rock 42 feet above high water, with some brushwood growing on it; it is almost joined to the islet (20 feet above high water) south of it by a reef and islet. Some rocks, from 6 to 10 feet above high water, lie nearly a cable northward of Pasir Kechil. The eastern islet of the group, 18 feet above high water, is a bare rock. Lat. 4° 36¾′ N. Long. 95° 34½′ E.

In the passage between the two groups there are depths of from 8 to 9 fathoms, and on the north-east side of it there is a patch, with 4 feet water over it, lying 3 cables N. ⅜ E. from the west extreme of Pasir Kechil; and another on which the depth is 17 feet N. by W. ¾ W. distant 3¼ cables from the same point and E.N.E. from the eastern extreme of Pasir Besar islet.

Pasir reef, composed of sand and coral, is about 300 yards in diameter, has 5 feet least water over it, and lies about a quarter of a mile east-north-east of Pasir Kechil.

These dangers are all "steep-to"; others uncharted may, however, exist.

Anchorage may be obtained in about 5 fathoms water, with Batu Tenga bearing S.E. distant 2 cables; or during the south-west moonson, if advisable, vessels may anchor in Chalang bay, about 4 cables eastward of tanjang Chalang.

The anchorage between pulo Reasam and Reasam rock is easy of access, as will be seen by the plan. Vessels should moor in these anchorages.

Directions.—Gunong Kwali or Rigas hill, described on page 272, is one of the most conspicuous landmarks on the west coast, being visible from a distance of 40 miles in clear weather, and, therefore, a good landmark when approaching Rigas harbour.

To enter the Southern harbour from the northward, it is advisable to pass westward of pulo Rangas at the distance of about half a mile, when a E. ¾ N. course may be shaped southward of Reasam rock, which is above water, for tanjong Lo Jahu. This point is "steep to" and may be

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Chart, 1,701 [2,533]. No variation.

passed at about a cable distance, observing that pulo Semut open eastward of pulo Anggang leads eastward of the sunken rocks southward of pulo Reasam.

Coming from the southward, a vessel may pass southward of the rocks above water lying southward of Pasir Besar, and bring tanjong Ló Jahu in line with the centre of pulo Anggang, bearing North, then passing about a cable westward of the point steer N.E. for the anchorage. There is said to be a good channel within the Pasir islets used by coasting vessels.

The Northern harbour is only available for small craft. The channel between reef north-west of pulo Reasam and the isolated reef off the north shore, is about 2 cables wide, and should only be used by those locally acquainted.

Chalang bay lies between the mouth of Meriri river, on the right bank of which is Ketapan Pasir village, and tanjong Chalang, high and thickly wooded.

On the south side of this point (off which there are two rocks above water, the outer about 1½ cables distant from it), landing may be effected on a sandy beach, avoiding some rocks which lie on the western side of it; northward of the point there is also a sandy beach with several cocoanut palms.

From Chalang peninsula the coast has an east and south-east direction and is bordered by rocks, which, with the surf, render landing impracticable; the only conspicuous marks on this part of the coast are a solitary house eastward of which is a tree with a perfectly white trunk, and further on a small grove of cocoa-nut palms in which Ketapan Pasir village stands.

Chalang reef, with 9 feet water over it, lies about 2 cables eastward of tanjong Chalang.

Lat. 4° 37½′ N. Long. 25° 35½′ E.

Johore reef, formed of coral, about one cable in diameter, and with 4 feet least water over it, lies about a mile westward of the mouth of the Meriri river, and 2½ cables off shore, with depths of 5 fathoms close-to. Gunong Kwali in line with the east side of Batu Tuuntg leads clear of it.

Anchorage, in about 5½ fathoms water, may be obtained between Chalang and Johore reefs, about 3 cables from the latter; this anchorage is fairly good even during the south-west monsoon, being somewhat sheltered by Pasir islets. The bottom in the bay consists almost everywhere of hard sand, sometimes mixed with stones and coral, and in places covered with a thin layer of mud or clay.

Chart, 2,760 [2,534].

COAST.—Rigas bay to Cape Felix.—The coast between Ketapan Pasir, about 3 miles eastward of Rigas bay, and Cape Felix (tanjong Raja, or Teku), a distance of about 77 miles, is of an entirely

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different character to that to the northward. The whole of it is low with a sandy beach and behind it a uniform row of aroe trees, similar in appearance to the pine tree. Chart, 2,760 [2,534]. No variation.

Near Waila river, there is, or was many years ago, a wide gap in the trees, covered with brushwood, with a group of six trees at the back conspicuously visible through the opening. Southward of this point the trees begin again, and continue in a regular line to near tanjong Tuba, about 7 miles beyond, where they cease. Lat. 4° 18′ N. Long. 95° 57′ E.

There is an extensive swamp between the Waila and Bubun rivers, named Raja Demet, which feeds the Laut-Ni lake within it. The Barisan or Gunong Itam range, which runs nearly parallel to the coast, is about 7 miles inland, or farther than on any other portion of the west coast of Sumatra. It is as devoid of conspicuous points as the coast itself. The coast is wooded with cocoa-nut trees from south of Melabu to the conspicuous wood at the mouth of the Tua river; southward of this are isolated aroe trees as far as the mouth of the Teripah river.

There are some small streams on this coast navigable by small craft within the entrances, but the bars are very shallow and treacherous, and only passable at times by those having local knowledge; there appears to be a lull after every 7 to 9 rollers.

The coast is on the whole free from known dangers and may be approached by the lead, but it is advisable not to approach within a depth of 10 fathoms, as the bottom shoals rapidly within it. The bottom is sand under 7 or 8 fathoms and mud beyond. The only charted dangers are those off Tuba and Melabu, and the doubtful dangers off the Teripah.

Mountains (continued from page 272).—Abong Abong mountain, 11,155 feet above high water, lies about 33 miles from the coast, north-eastward of cape Felix; it is a slightly curved, dome-shaped summit, only distinguishable from the surrounding mountains by its great height.

Gunong Gredong, south-westward of Abong Abong, and about 22 miles from the coast, is supposed to be the only active volcano in the province of Acheh. Lat. 4° 10′ N. Long. 96° 38′ E.

COAST.—Sabil river discharges by two mouths, the Kwala Sawang and Kwala Kalung, at 5 and 6 miles south-eastward of Rigas bay; they are available for boats when the wind and swell are favourable for entering.

Panga river, 4½ miles south-eastward of Kwala Kalung, has a village of the same name on its left bank. It is not easily identified, but the aroe trees are slightly higher near it than on either side. The Un creek connects the Panga and Tenom rivers, and is much used for communicating between the two villages. Lat. 4° 33′ N. Long. 95° 43′ E.

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Chart, 2,760 [2,534]. No variation.

Tenom river is easily identified by a promontory which from a distance looks like an island, situated about one mile southward of it. Tenom village is on the right bank within the entrance, which is less difficult to enter than the Panga. The Bakongan river, of no importance, lies 4 miles south-east of it.

Waila river.—The Lambalik is an insignificant stream which has the same mouth as the larger Waila river. The aroe trees extending along the coast from the northward, cease near the north bank of the Waila, rendering the mouth of that river easily recognisable from a considerable distance. The depth or navigability of the Waila is not stated, but is apparently of no importance.

Plan, 2,760 [2,534]. Lat. 4° 12′ N. Long. 96° 1′ E.

BUBUN BAY, within tanjong Tuba, affords good anchorage in 5 fathoms water, sheltered from all winds between W.S.W., through north, to East within the reefs mentioned below. Bubun village lies on the west side of the bay, at the head of which the river of the same name discharges.

Tanjong Tuba, the west extreme of Bubun bay, is a low promontory with some peculiar trees resembling mops, but these will not be noticed when coming from the northward. There is also a cocoa-nut grove at the village, which may help to identify it.

Reefs.—A coral reef partly dry at low water, extends 4 cables south-west of tanjong Tuba, and continues along the coast to abreast the village, but at a much less distance. Four small reefs, with depths of less than 3 fathoms over them, lie respectively N.W. $\frac{2}{3}$ N. about 7 cables, N.W. by W. $\frac{3}{8}$ W. 7 cables, W.N.W. about one mile, and W. by N. distant half a mile from tanjong Tuba.

Two reefs lie eastward of the point; the southern is 4 cables in length by 2 cables in breadth, with a least depth of 2 fathoms over it and 7 fathoms around, and its nearest point lies S.E. $\frac{5}{8}$ E., distant one mile, from the point. The northern reef dries, has a depth of from 6 to 7 fathoms around, and lies one mile eastward of the point.

Plan, 2,760 [2,534].

MELABU (Analabu) BAY, though of the same shape and nearly the same extent as Bubun bay, affords far less protection, there being no reefs seaward as at that anchorage. The bay is encircled by a reef which extends to the distance of half a cable off the western mouth of Melabu river.

The Kwala Changkul, or western mouth of the Melabu river, was originally a canal, but is very shallow; small steam vessels cross the bar at high water, and navigate for a distance of about 4 miles to South Mareh village. The Kwala Marabu, or eastern mouth, is one mile to the eastward of the Kwala Changkul, and has less water on its bar.

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Karang point, the west extreme of Melabu bay, is a low point covered with cocoa-nut trees, and may further be distinguished by the buildings of the settlement. A coral reef projects about one cable southward of the point, and has three rocks above water on it. Plan, 2,760 [2,534]. No variation.

LIGHT.—On Karang point an open iron work frame support 42 feet in height and painted white exhibits, at an elevation of 49 feet above high water, a *white group occulting* light showing groups of three occulations *every thirty seconds*, thus:—Light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* it should be visible, in clear weather, from a distance of 12 miles, between the bearings of N. 86° W., through north and east, to S. 56° E. Lat. 4° 8′ N. Long. 96° 7′ E.

Dangers.—Five small reefs lie westward of the point; the western has a depth of 2 fathoms over it, and lies W. by N. ½ N., distant 1½ miles, from Karang point; the other four have from 9 to 14 feet and lie nearer the shore; the southernmost with 12 feet water over it lies S.S.W. ⅓ W., distant half a mile, from the point; they are marked by breakers.

A reef about 2 cables in length in an east and west direction, and with less than 3 fathoms water over it, lies near the shore north-west of Karang point, which bears from it S.E. ½ S., distant about 1½ miles.

Dutch station.—The Dutch station and military outpost of Melabu is situated on the right bank of the Kwala Changkul, the western mouth of Melabu river. There is a landing place for boats here, but communication is often rendered impossible on account of the heavy surf.

Communication.—The Netherlands Royal Packet Company's steamers, running between Batavia, Padang, Penang, and Singapore, and touching at a number of intermediate ports in Sumatra, call here fortnightly, going and returning. *See* Chapter I., page 21.

Supplies of fresh provisions and water may be obtained in small quantities, and firewood is abundant.

Trade.—Melabu has a considerable trade in pepper.

Anchorage.—There is anchorage in about 5 fathoms water, over sand and mud, with the flagstaff about W. by N., but there are usually rollers setting in, rendering it necessary to be ready to leave it at any moment. The bay is unhealthy, and it is advisable to anchor as far off as possible to avoid the stench of the coral and mud flats.

Tides.—The tides are inconsiderable, but occasionally rise as much as one foot.

See chart, 2,760 [2,534].

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Chart, 2,760 [2,534].
No variation.
Lat. 4° 0′ N.
Long. 96° 12′ E.

COAST.—Tua or Senegan river enters the sea at about 4½ miles south-eastward of Melabu; its mouth is shallow, but it is said to be deep within; there is a well-defined clump of high trees near its south point, which affords also a good mark for Melabu when approaching from the southward.

Terang river lies 5 miles south-eastward of Tua river; its mouth is also shallow, and a patch of 5 fathoms is charted 1¼ miles off it. Some trade is carried on by Telang and Padang villages, the latter 5 miles beyond, at the mouth of the Tadu, a similar stream; off both places there is temporary anchorage in from 5 to 6 fathoms water.

Teripah river has three mouths and is available for boats under favourable circumstances; the northern mouth is known as the Teripah, the middle as Sikandang Chut, and the southernmost as Sikandang Rajut.

Dangers.—A reef with 3 fathoms water over it and 9 fathoms around, is charted about 3 miles westward of the middle mouth, but it was unsuccessfully searched for by H.N.M. vessel *Palembang* in 1882, and no signs of discolouration or heave were observed, although there was a heavy swell on during the time occupied in the search.

A reef with a depth of 3 fathoms over it, the existence of which is doubtful, is charted south-westward of the southern mouth and about 2 miles from the coast; it is advisable when passing near the assigned positions of these reefs to keep in depths above 10 fathoms.

Sanaam stream, 4 miles north-westward of cape Felix, is of no importance: it has the village of Kota Pasei on its right bank. A reef lies close inshore between its mouth and cape Felix.

Lat. 3° 43¼′ N.
Long. 96° 32¼′ E.

CAPE FELIX (Tanjong Raja or Teku) is a very low and rounded promontory, overgrown with brushwood and difficult to identify, but it is free from known dangers.

Lat. 3° 40′ N.
Long. 96° 18½′ E.

Off-lying reefs.—A small coral patch, with a depth of 4 fathoms over it, lies with cape Felix bearing E. by N. ⅜ N. distant about 14¼ miles.

Lat. 3° 34½′ N.
Long. 96° 23′ E.

A reef with 5½ fathoms water over it, 1½ miles in length, in an east and west direction, by half a mile in breadth, and with very deep water around, lies with cape Felix, bearing N.E. ⅛ E., distant 13 miles.

Lat. 3° 32′ N.
Long. 96° 32′ E.

A rock, with a depth of less than 3 fathoms over it, lies with cape Felix, bearing N. ⅛ E., distant 12¼ miles, and is usually marked by breakers.

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A reef, 1½ miles in extent, with 4 fathoms water over it, lies with cape Felix bearing from its north-west extreme N. ⅛ W., distant 12¾ miles. Chart, 2,760 [2,534]. Var. 0° 5′ E.

Crimea reef, with a depth of 4½ fathoms over it, and 32 fathoms around, lies with cape Felix bearing N.W. by W. ⅔ W., distant 12 miles, and 6¼ miles south-westward of Susu Susu. Lat. 3° 38′ N. Long. 96° 43′ E.

A patch, with from 6 to 7 fathoms water over it, lies east-south-east, distant 3½ miles, and another with a depth of 3 fathoms and marked occasionally by breakers, S. ¼ E., distant 4½ miles from Crimea reef.

Assahan reef about 2 miles, S. by W. ⅓ W. from Crimea reef, has a least depth of 3½ fathoms over it, is "steep-to," and surrounded by depths of from 30 to 32 fathoms; the water is discoloured over this reef.

A patch with less than 3 fathoms water over it, marked by breakers, lies with cape Felix bearing N.W. ⅜ N., distant 14½ miles; and 4 miles westward, about 1½ miles south-eastward, and 5 miles east-north-eastward of the patch, are shoals with 8, 5, and 5 fathoms water over them respectively. The positions of these dangers will be best seen by referring to the Admiralty chart, but others, at present undiscovered, may exist. Lat. 3° 32½′ N. Long. 96° 42′ E.

COAST.—Cape Felix to tanjong Palikala.—From cape Felix the coast trends eastward for about 14 miles to Susu Susu, then south-eastward for about 60 miles to tanjong Kamarang; from which, forming a bight in which Trumon is situated, it trends southward to tanjong Palikala, abreast the Banjak islands.

The appearance of this coast varies greatly. Eastward of cape Felix it continues low and sandy, a row of lofty trees appearing between the outlets of the Lama Tua and Lama Muda; thence the coast is hilly, and between Maki and Terbangan Chut is in many places precipitous. A succession of sand dunes extend along the coast between the mouths of the Kluat river, and the sandy coast between the Kluat and tanjong Kamarang is lined with aroe trees. In the neighbourhood of Trumon the land is marshy. The promontories on this coast render it easy to locate a vessel when within a few miles of the shore; and the mountains should soon be recognized. There are no streams of any importance.

Mountains (continued from page 285)**.—Gunong Lūze,** the highest of the Sinobong range, will easily be recognised by its two very sharp peaks; it is 12,140 feet above high water and lies on about the parallel of cape Felix, at 15 miles from the coast. Bearing about north-east it shows as a saddle. Within 2 or 3 miles of the coast are the following peaks:— Lat. 3° 45′ N. Long. 97° 7′ E.

Lok Pau stands somewhat isolated, and may be recognised by its peculiar form, a round hump, which presents the same appearance from Lat. 3° 39½ N. Long. 96° 52′ E.

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Plan, 2,760 [2,534]. Var. 0° to 0° 10′ E.

nearly all directions. It is the first summit of the coast range, which begins a few miles southward of Susu Susu.

Lat. 3° 38′ N. Long. 96° 54′ E.

Gunong Mangin, the next peak southward, is a green hill 3 miles within the point of the same name. Kumajau, Kubu, Piatu and Labo Gaja are peaks of the same range, which trends parallel to the coast.

Lat. 3° 27½′ N. Long. 97° 6′ E.

Gunong Maki is high; on its north side it looks like a stairway with one step to it; it lies on the south side of rather a wide valley.

Gunong Tuan is easily recognised, and is a useful mark when approaching Tampat Tuan. Seen from the southward it shows as a high peak with three lower ones descending like steps to the eastward.

Lat. 3° 10′ N. Long. 97° 17′ E.

Gunong Terbangan Chut, close to the coast, is a very sharp peak with a steep slope to the southward, and is easily recognised.

Gunong Belang Balok, 8 miles to the southward, is 4 miles from the coast at the back of the plain through which the Kluat river discharges; it shows a slight saddle off this river.

Lat. 2° 50½′ N. Long. 97° 50′ E.

Gunong Trumon lies about 13 miles within Trumon, and when bearing east appears as a high flat summit with almost precipitous sides, but bearing north-east it slopes gently on both sides. Kokohan is a round hill midway between it and the coast. *Continued on* page 312.

CAUTION.—Islets and dangers.—There are several islets off this coast, and numerous isolated dangers, many out of sight of land, which render navigation hazardous. Reefs, with depths of less than 3 fathoms, generally show by breakers or rollers, but others are indicated neither by breakers nor by discolouration of the water. Dangers doubtless exist that are not charted, and some of those known are not correctly placed, as the coast has never been properly surveyed.

The nature of the bottom changes completely southward of cape Felix; whereas northward of it the depths decrease regularly, vessels come suddenly into considerable and irregular depths southward of it, which depths will be found close to dangerous shoals. The lead, however, should not be neglected, and a good look-out aloft should always be kept during the day. Night navigation is attended with considerable risk.

Coast.—Dangers.—From cape Felix the coast trends eastward for 11 miles to Arun point, with several detached reefs with deep water around them. Between Siserei and Simanyam rivers, and near the coast, there is a coral reef 2 miles in length and a cable in breadth, and a rock, with less than 3 fathoms water over it, is situated S.E. by E. ⅔ E., distant one mile, from the Simanyam mouth.

Four small reefs lie between the Surean and Lama Tua mouths, the southernmost and largest being $1\frac{2}{10}$ miles from the shore and south-south-east of the former mouth. Both outer reefs are usually marked by breakers.

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KWALA BATU and SUSU SUSU BAY, situated respectively 12 and 14 miles eastward of cape Felix, affords some protection during the south-west monsoon, being sheltered from north-west winds, which sometimes blow with considerable force, when a heavy roll sets into both these anchorages; the latter bay has anchorage space in a depth of about 4 fathoms, about a quarter of a mile in extent on either side of the shoal situated in the centre of the bay, and it is therefore only available for small vessels.

Plan, 2,760 [2,534].
Lat. 3° 43½′ N.
Long. 96° 45¾′ E.
Var. 0° 5′ E.

Villages.—Kampong Batu lies on the west side of the mouth of the Batu stream, and a zinc roofed house near it is a good landmark. Susu Susu village lies in the south-east corner of the bay of that name, and the stream near it and also the Batu are navigable by boats only. The natives are not to be trusted.

Arun point, the west extreme of Kwala Batu bay, is a low promontory easily recognised by the long row of lofty aroe trees extending westward from the point; it has depths of from 8 to 10 fathoms at one cable off it. The mouth of the Lama Muda river is 7 cables westward of the point. Small and shallow reefs lie one mile west and a third of a mile east of the point, from one cable to 2 cables offshore.

Gulau Kaju and ujong Seranga are somewhat similar low promontories, both having trees; the latter may be known by several cocoa-nut stumps and the village standing in a group of trees; they are both fringed by coral reefs extending generally about 2 cables, but south-eastward of Kuja point the reef extends fully a third of a mile. A considerable portion of ujong Seranga was submerged by an earthquake in 1861.

Beacon.—A beacon, consisting of a tree, 36 feet above high water, and surmounted by a horizontal cross with a ball above it, stands 160 yards, N. by E. $\frac{1}{8}$ E., from the extremity of ujong Seranga; the ball, cross, and stem of the tree for a distance of about 6 feet downwards are painted white, and, with a glass, the beacon should be seen, in clear weather, from a distance of 4 miles.

Dangers in the approaches.—Lama reef, with a least depth of one fathom over, and 25 fathoms around it, is about 4 cables in length; from its centre, Arun point bears N.N.E. $\frac{2}{3}$ E. distant about $1\frac{9}{10}$ miles.

Arun reef, about 6 cables in length in a north-north-west and south-south-east direction, and with 3 feet least water over it, lies north-eastward of Lama reef; from the northern extreme Arun point bears N. $\frac{3}{4}$ E. distant 5 cables. About 4 cables eastward of Arun reef, another reef, with 2 fathoms water over it, lies with Arun point bearing N.N.W. $\frac{1}{8}$ W., distant 7 cables.

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Plan, 2,760 [2,534]. Var. 0° 5′ E.

Berua reef, with 8 feet least water over it, lies three-quarters of a mile north-eastward of Arun reef, with Arun point bearing N.W. $\frac{5}{8}$ W., distant 5 cables

A reef, with less than 3 fathoms water over it, lies 5 cables eastward of Arun point and 2 cables from the shore.

Lat. 3° 41½′ N. Long. 96° 43′ E.

Karang Chano, a reef with 2 fathoms water over it, and half a mile in length in a north-west and south-east direction, lies with Arun point bearing N. $\frac{1}{8}$ W. distant $2\frac{1}{10}$ miles; all these reefs may easily be seen by breakers or a heave of the sea over them.

Potomac and Se Umput, two small coral patches with 5 and 11 fathoms water over them respectively, lie N.E. by E. $\frac{3}{4}$ E., distant 9 cables, and S.S.E. $\frac{1}{2}$ E., distant 8 cables from the south extreme of Karang Chano.

Kaju reef, with one fathom water over it, lies with Kaju point bearing N.E. $\frac{5}{8}$ E., distant 6 cables; 3 cables south-east of it there is a coral patch with a depth of 5 fathoms, and 4 cables southward of it another patch on which the depth is $3\frac{1}{2}$ fathoms.

A reef, with $1\frac{3}{4}$ fathoms water over it, lies with Kaju point bearing E. $\frac{3}{4}$ S., distant 7 cables.

Deli rock, a small and dangerous reef with $3\frac{1}{2}$ fathoms water over it, lies with Kaju point bearing N. by E. $\frac{1}{2}$ E., distant $1\frac{2}{10}$ miles, and ujong Seranga N.E. by E. $\frac{2}{3}$ E.

The shoals or coral patches, lying to the southward of ujong Seranga, are so numerous that reference to the Admiralty plan will give a much clearer idea of their various positions than any written description. They may, however, be briefly described on several general bearings from ujong Seranga.

S.W. $\frac{1}{8}$ S. from the point three shoal patches with depths of $3\frac{3}{4}$, $3\frac{3}{4}$, and $4\frac{1}{2}$ fathoms, distant from it respectively 1 mile, $1\frac{2}{10}$, and $1\frac{4}{10}$ miles.

S.S.W. $\frac{7}{8}$ W. from the point, patches of $2\frac{1}{2}$, 7, and 4 fathoms, distant from it $\frac{6}{10}$ mile, $1\frac{6}{10}$ and $1\frac{5}{10}$ miles respectively.

S. by W. $\frac{1}{4}$ W. from the point, patches of 3 and $6\frac{1}{2}$ fathoms, distant respectively $1\frac{5}{10}$ and $1\frac{7}{10}$ miles.

South from the point, patches of 5 and 4 fathoms, distant from it $1\frac{7}{10}$ and $2\frac{1}{10}$ miles respectively.

S. by E. $\frac{1}{8}$ E. from the point, patches of 4, 3, and 3 fathoms, distant respectively from it one mile, $1\frac{7}{10}$, and $2\frac{7}{10}$ miles.

Lat. 3° 42′ N. Long. 96° 47′ E.

San Kalan, a bank of sand and coral patches, which dries, is half a mile in length in a north and south direction, its south extreme being S.S.E. $\frac{1}{8}$ E., distant $1\frac{5}{10}$ miles from ujong Seranga; fishermen sometimes put up a staff with a white flag on this shoal.

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The position of Deli rock and some of the other reefs were fixed by H.N.M. vessel *Benkulen* in 1895, and it is probable that some reefs charted and not examined may be identical with those fixed by that vessel. Plan, 2,760 [2,534]. Var. 0° 5′ E

In the centre of Susu Susu bay there is a patch with a depth of one fathom, and depths of 10 fathoms around.

Anchorages.—Kwala Batu bay affords anchorage in 17 fathoms water, over mud, at about one-third of a mile south of Kwala Batu creek; with Kaju point bearing E. by S. $\frac{5}{8}$ S. and Batu village N. $\frac{1}{8}$ W., the village lies westward of the mouth.

Outside Susu Susu bay there is anchorage in 13 fathoms water, over mud, with ujong Seranga bearing E. by N., and Kaju point N.W. $\frac{2}{3}$ N. Small craft will find better shelter in the bay, off Susu Susu village, in a depth of about 5 fathoms, but there is a heavy roll on at times, even there, during the south-west monsoon.

Directions.—Coming from seaward bring the zinc roof of the house of the Raja of Kwala Batu, situated on the left bank of the Kwala Batu, to bear North, and steer in on this bearing until the beacon on ujong Seranga bears N.E. $\frac{1}{4}$ E., when alter course for it, until at a distance of about 5 cables from the point, when, in order to avoid the shore reef, course must be shaped for the anchorage.

If bound to Susu Susu outer anchorage, continue on with ujong Seranga beacon bearing N.E. $\frac{1}{4}$ E., until Kaju point trees bear North, when the vessel will be within Deli rock, and may steer midway between Kaju and Seranga points, anchoring in 13 fathoms water, over mud, when the latter bears E. by N.

Small craft can enter the bay and anchor off Susu Susu village as above stated, avoiding the reef which extends 2 cables off the point, and the patch of one fathom situated in the centre of the bay.

CAUTION.—The Deli rock and reefs near it seldom break, and are "steep-to," requiring considerable caution when entering, and there is no discolouration of the water by which they might be seen. The Kaju, Karang Chano, Lama, Arun and Berua usually break. Chart, 2,760 [2,534].

COAST.—From Susu Susu bay the coast trends south-eastward for about 7 miles to Pau North, fronted by the shoals mentioned in the approach to Susu Susu, for the first 3 miles.

Pau North is a low and steep promontory covered with aroe trees, and may be identified by Lok Pau North, a hill about 2 miles north-eastward of it. A reef projects half a cable off the point. Lat. 3° 39′ N. Long. 96° 50½′ E.

Dangers.—There are four reefs in the vicinity of Pau North, with depths of less than 3 fathoms, and within the distance of 3 miles. They lie respectively N.W. $\frac{3}{4}$ N., distant $1\frac{2}{10}$ miles; N.W. $\frac{1}{3}$ W., $2\frac{1}{2}$ miles;

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Chart, 2,760 [2,534]. Var. 0° 5′ E.

W. ⅜ N., half a mile; and S.S.W., 2¼ miles of the point, all being surrounded by deep water; the last-mentioned is about 2 miles off Mangin, has 2 fathoms water, and there is usually a heave over it.

A shoal, with 5 fathoms water over it, lies S.W. by W. ⅜ W., distant 5 miles from Pau North.

Lat. 3° 35′ N. Long. 96° 54′ E.

Cape Mangin is low and rounded, with Mangin village on the left bank of the river of the same name; the coast reef extends from one cable to 1½ cables off the point. Pau Baru is a small village, at the mouth of the river of the same name 3¾ miles south-eastward.

Dangers.—A reef, with less than 3 fathoms water over it, lies half a mile off shore and about one mile westward of Pau Baru.

Suwa Lokau, a reef with 2 fathoms water over it and depths of 4½ to 5 fathoms around, lies one mile from the shore, about 1¼ miles S. by W. ½ W. of Pau Baru; it does not always break.

Anchorages.—There is anchorage, in from 8 to 9 fathoms water, with good holding ground, off the mouth of the Mangin river, and in similar depths off the mouth of Pau Baru.

Labuan Haji is a small bay open to the southward and surrounded by rather high land. The village of the same name lies on its west side, and its tall cocoa-nut trees are visible from a considerable distance in the offing. There are several villages; Pulu Car lies westward of the west point of the bay, and Kemumu and Bakau near the mouth of a stream to the eastward of the bay.

Anchorage.—There is anchorage between two reefs about one mile apart, with Labuan Haji village bearing N. by E. ¾ E., Pulu Car village N. ⅝ W., and cape Mangin N.W. by W. ⅛ W., in from 13 to 15 fathoms water, but there is considerable swell here. The bay, northward of the line of the west point bearing W. by N. ⅞ N., is foul.

Dangers.—A reef, with less than 3 fathoms water over it, lies with the west point of Labuan Haji bay bearing E. by S., distant 3 miles, at about half a mile off shore, and a similar reef lies with the same point N.E. by E. ¾ E., distant 2½ miles; a shoal, with a depth of 6 fathoms over it, lies in the offing with cape Mangin bearing N. by W. ½ W., distant 6 miles.

Lat. 3° 30½′ N. Long. 96° 52′ E.

A reef, with one fathom water over it, lies with the west point of Labuan Haji bay bearing E. by N. ⅔ N., distant 7 cables, and a similar patch with the point N.N.E. ⅓ E., one mile.

A patch with less than 3 fathoms water over it lies with the west point of Labuan Haji bay bearing N. ¾ W., distant 1¼ miles, and another with a depth of 2½ fathoms with the same point N. by W. ⅛ W., 7 cables.

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Gosong, a bank of sand and coral, which dries, lies with the west point of Labuan Haji bay bearing N. by W. $\frac{7}{8}$ W., distant one mile. Chart 2,760 [2,534]. Var. 0° 5′ E.

A rock, with less than 3 fathoms water over it, lies 2 cables off shore with the west point of Labuan Haji bay bearing N.N.W. $\frac{2}{3}$ W., distant $1\frac{2}{10}$ miles, and a rock with less than 3 fathoms, with the point N.N.W. $\frac{2}{3}$ W. distant 6 cables.

A reef, with less than 3 fathoms water over it, lies 7 cables off shore, with the point southward of Kemumu bearing N.N.W. $\frac{2}{3}$ W., distant $1\frac{1}{2}$ miles. With the exception of the last three mentioned, the reefs will generally be observed by the sea breaking over them.

Pelumat.—Dangers.—Pelumat is a small village on the coast about 2 miles south-eastward of Kemumu; westward of it within $4\frac{1}{2}$ miles of the coast are the following reefs:— Lat. 3° 29′ N. Long. 97° 2′ E.

A rock, with less than 3 fathoms water over it, lies W. $\frac{1}{8}$ S., distant 7 cables from Pelumat, and a reef, with a similar depth over it N.W. by W. $\frac{1}{8}$ W., distant 3 miles from Maki point; one mile east-south-eastward of this latter reef there is a rock just above water.

A reef, with 3 fathoms least water over it, lies N.W. by W., distant 2 miles from Maki point.

A rock, with less than 3 fathoms water over it, lies three-quarters of a mile off the coast westward of Pelumat; these reefs are usually visible by the sea breaking over them.

A patch, with a depth of 4 fathoms over it, lies with Maki point bearing E. $\frac{1}{4}$ N., distant $3\frac{3}{4}$ miles. Lat. 3° 26¼′ N. Long. 96° 59′ E.

A coral patch, with less than 3 fathoms water over it, which nearly always breaks, lies with Maki point bearing E. by S. $\frac{1}{2}$ S., distant 5 miles.

MAKI BAY lies between Maki point and Batu Tongga, and is open to south and south-west winds, so that there is generally a heavy roll in it; the coast is hilly. Labuan Tarab village is situated in the southern part of the bay. Maki point is low and covered with cocoa-nut trees, with Maki village within it; a reef extends about one cable off the point. Gunong Maki, the high hill within, is mentioned on page 290. Plan, 2,760 [2,534]. Lat. 3° 26′ N. Long. 97° 2¼′ E.

Serudung island, a small, rocky, uninhabited island, lies about 100 yards from, and connected by a reef with, the coast, 3 miles southward of Maki, and is not easily distinguished from the southward; nearly a mile southward of the island is Tring Medum village.

Dangers.—A reef, with 4 fathoms water over it and "steep-to," lies with Maki point bearing N.E. $\frac{1}{8}$ E., distant 2 miles.

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Plan, 2,760 [2,534]. Var. 0° 5′ E.

Karang Gar Bua, a patch with 3 fathoms water over it, with depths of 22 fathoms at a short distance, lies on the west side of the anchorage, with Maki point bearing N.N.E. $\frac{1}{3}$ E., distant about 6 cables.

Karang Gar Ne, with a depth of 2 fathoms over it, lies with Maki point bearing N. by E. $\frac{1}{8}$ E., distant 2 miles, and Batu Tongga E. by N. $\frac{1}{8}$ N.

A rock, with $3\frac{1}{2}$ fathoms least water over it, and depths of from 7 to 8 fathoms around, lies with Maki point bearing N.N.W. $\frac{3}{8}$ W. and Serudung island S.E. $\frac{5}{8}$ E.

In the offing, westward of Maki are following dangers:—

Lat. 3° 31′ N. Long. 96° 52′ E.

A bank with a depth of 6 fathoms over it, lies 4 miles from the coast, with Gunong Maki bearing E. by S., distant $13\frac{1}{2}$ miles, and a patch of 4 fathoms water with Maki point E. $\frac{1}{4}$ S., distant $8\frac{1}{2}$ miles.

Lat. 3° 26½′ N. Long. 96° 51′ E.

A patch with 3 fathoms water over it, lies with Maki point bearing E. $\frac{1}{4}$ N., distant $11\frac{3}{4}$ miles, and about half a mile S.S.E. and W.N.W. of it are two shallow heads which break at times.

Lat. 3° 24′ N. Long. 96° 52′ E.

A rock with less than 3 fathoms water over them, which occasionally breaks, lies with Serudung island bearing E. $\frac{3}{8}$ N., distant about 12 miles.

Two banks, with depths of 5 fathoms over them lie respectively with Serudung islet bearing E. $\frac{3}{4}$ N., distant $4\frac{1}{4}$ miles, and E. $\frac{1}{4}$ N., about 15 miles. A patch, with 3 fathoms water over it, lies with the islet bearing N. by E. $\frac{1}{8}$ E. distant one mile.

Anchorage.—Vessels should not anchor in less than 17 fathoms water, where the holding ground, of mud and sand, is good; nearer the shore it is sand or coral; a good position in that depth, over sand and mud, is with Batu Tongga bearing S.S.E. $\frac{1}{8}$ E. and Labuan Tarab village E. $\frac{3}{4}$ S. There is anchorage also in the same depth within Karang Gar Bua, three-quarters of a mile southward of Maki village.

Directions.—On account of the reefs above-mentioned, Maki is somewhat difficult of approach, coming either from northward or southward. The coast should be kept at a distance of 4 or 5 miles, and when Serudung island is distinguished, course should be shaped to bring it between the bearings of E. by N. and N.E.; then steer for it until Maki point bears N. by W. $\frac{1}{8}$ W. or the islet is about one mile distant, when Maki point should be steered for, anchoring in one of the positions before mentioned.

Chart, 2,760 [2,534]. Lat. 3° 21′ N. Long. 97° 9′ E.

COAST.—Lok Pau South, a somewhat isolated hill, lies $7\frac{1}{2}$ miles south-eastward of Maki within the point of the same name; Alur Paku, Tring Medum, and Swang Sekuda villages are situated on the coast between it and Serudung island.

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Pau South point is low, and eastward of it is the small village of the same name. Chart, 2,760 [2,534]. Var. 0° 5′ E.

Anchorage.—The bay is open to southerly winds, but affords temporary anchorage in 17 fathoms water, with Pau South point bearing N. by W. $\frac{3}{8}$ W. distant about half a mile; the bottom is not good holding ground in less depths.

Batu Belajar, a white rock situated about 30 yards off shore, at 2 miles south-eastward of Lok Pau South, is a good landmark; the point near the rock has a single tree on it. Sama Dua village lies about one mile southward of it. The depths are considerable near the coast, but patches may possibly exist.

Dangers.—A reef with less than 3 fathoms water over it, lies with Pau South point bearing E. by N. $\frac{1}{8}$ N., distant $5\frac{1}{2}$ cables; a reef with a depth of 4 fathoms with the point N. $\frac{3}{4}$ E. distant 3 cables; and one of 3 fathoms with the point N.N.E. $\frac{5}{8}$ E., $1\frac{3}{4}$ miles. The two shallowest are generally visible from the roll of the sea over them.

Off-lying dangers.—A patch with 5 fathoms water over it lies with Pau South point E. by N., distant $4\frac{3}{4}$ miles, and the fishermen report a patch of 11 feet as being situated about one mile west of this position; they are probably identical, and should be given a wide berth; it probably breaks. Lat. 3° 20½′ N. Long. 97° 2′ E.

Two reefs, having a depth of 4 fathoms over them, lie $6\frac{1}{2}$ miles W. by S. $\frac{1}{3}$ S. and S.W. by W. $\frac{1}{2}$ W. respectively from Batu Belajar, and a coral reef which shows discoloured water is reported to lie about N.E. by E. $\frac{1}{2}$ E. distant one mile from the northern 4 fathoms reef.

TAMPAT TUAN BAY, open to southerly winds, and situated between Tuan and Batu Itam points, is rather more than one mile wide in an east and west direction, and divided by ujong Rokban, on which there is a flagstaff. The western part is encumbered by Gusong Puka, but the eastern within Gusong Gulu is clear. Plan, 2,760 [2,534]. Lat. 3° 15′ N. Long. 97° 10′ E.

The shore of the bay is high and steep, consisting of wooded rocks and high hills and fronted by a reef in most places, but abreast Tampat Tuan there is a narrow channel through it, affording access to a good landing for boats. Supplies are scarce. Telok Bengkuang is the eastern portion of the bay, in which is the village of the same name, Tampat Tuan village being in the western portion.

LIGHT.—On Tuan point an open ironwork frame support, 45 feet in height and painted white, exhibits at an elevation of 184 feet above high water, a *white group occulting* light, with a period of system of *thirty seconds*, showing light, *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three*

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Plan, 2,760 [2,534]. Var. 0° 5′ E.

seconds. It should be visible in clear weather, from a distance of 13 miles from the bearing of S. 49° W. through west and north and S. 47° E.

Communication.—The Netherlands Royal Packet Company's steamers, running between Padang, Penang and Singapore, call fortnightly. (*See* page 21.)

Pier.—A pier, 436 feet in length, extends in an E. by S. direction from the shore immediately northward of Tampat Tuan village.

Dangers.—Batu Tongkab, a small rock about 2 feet above high water, with depths of 15 to 30 fathoms around, lies with Tuan point bearing E. ½ S., distant nearly one mile.

Batavia rock, with a depth of 3 fathoms over it, lies N. by W. ¾ W., distant 3 cables, and another rock, with possibly less depth, S.W. ½ W. 7 cables from Batu Tongkab.

Batu Kuseah, awash, lies one cable south-westward of Tuan point, and always breaks.

Gusong Puka, a reef with a least depth of 1½ fathoms over it, and 4 fathoms between it and the shore reef, is "steep-to" on its south side, and lies in the centre of the west bay of Tampat Tuan.

Buoy.—The south-east side of Gusong Puka is marked by a can buoy, painted black, and moored in 7 fathoms water.

Gusong Gulu, with a depth of 2 fathoms over it, 19 fathoms close-to on its seaward sides, and the same depth in the channel between it and the shore, lies 1½ cables south-westward of ujong Batu Merah; it usually breaks. Batu Itam are two rocks above water, close off the point of the same name, with a depth of 15 fathoms close-to.

Anchorage.—There is anchorage in about 20 fathoms water, over mud, south-eastward of Gusong Puka, about 2½ cables southward of ujong Rohban; in less depths the bottom is foul, but there is possibly anchorage for small craft off Tampat Tuan village northward of Gusong Puka.

There is no great difficulty in approaching the anchorage as the reefs are usually visible by the breakers over them. Gunong Tuan (page 290) is a useful mark.

Chart, 2,760 [2,534]. Lat. 3° 15′ N. Long. 97° 4½′ E.

Off-lying dangers.—A patch on which the depth is 4 fathoms, lies with Tuan point bearing E. ⅛ N., distant 5 miles; a coral patch, with 4½ fathoms water over it, lies with the same point bearing E. by N. ⅝ N. distant 6 miles; these reefs have deep water around them.

Reefs, with 1½ and 3 fathoms water over them, lie respectively with Tuan point bearing N.E. ⅓ N., distant 7½, and N.E. by E. ¾ E. 8 miles, but the position of the former reef is doubtful.

Lat. 3° 8′ N. Long. 97° 3′ E.

A coral reef, on which the depth is 3½ fathoms, is situated with Tuan point bearing N.E. ⅓ E. distant 9½ miles.

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COAST.—Telok Rukam is the bight eastward of a steep and rocky point of the same name and which has a depth of 9 fathoms close-to. Rukam and Ayer Penang villages are situated on the sandy shore of the bay, off which there is anchorage in 7 to 8 fathoms water. Between Telok Rukam and the mouths of the Kluat river are Rasian and Asahan villages; there are no charted dangers within 2 miles of the shore, though some may exist. Chart, 2,760 [2,534]. Lat. 3° 13½′ N. Long. 97° 12½ E. Var. 0° 10′ E.

Dangers.—A patch, with 5 fathoms water over it, lies with Kwala Bak Ur, the northern mouth of Kluat river, bearing S.E. by E. ½ E., distant 3½ miles.

Reefs. — In the offing, a reef with 1½ fathoms water over it, lies with Kwala Bak Uar bearing E. ½ N., distant 9 miles, and another with a less depth than 3 fathoms, with Kwala Bak Ur bearing N.E. by E. ½ E., 13¾ miles; these are usually marked by breakers. Lat. 3° 4′ N. Long. 97° 9′ E.

A reef, with 2 feet water over it, is situated about 6 miles, west-south-west of Kwala Bak Ur. Lat. 3° 2′ N. Long. 97° 12′ E.

Kluat river rises in the Sinobong mountains, runs parallel to the coast for the greater part of its course, and discharges by two mouths about 3 miles apart; these can only be entered by native boats by watching the surf until a favourable opportunity occurs. A range of sandhills forms the coast between the mouths, and a sandbank extends one mile seaward, which may be approached by the lead to a depth of 7 fathoms.

The northern mouth is named Bak Ur, and has the somewhat large villages of Kedei Acheh and Kedei Melaju on either side of the entrance. Toca, the southern mouth, has no village, but that of Lembong is situated at the mouth of the stream of the same name, one mile further southward.

Reef.—A reef, 400 yards in length, in a north-north-east and south-south-west direction, 200 yards in breadth and with a least depth of 3 feet over it, is reported to exist in the approach to Kluat river.

Landmark. — The sandhills between the mouths of this river form an important landmark, and the plain behind extends farther back than on any other portion of this coast (page 269); Kinja and Belang Balok hills lie within the plain.

Kamarang and Manker are the names applied to the low and rounded promontory situated about 6 miles southward of Kluat river, whence the coast, trending eastward to Bakongan, is fronted by a sandy beach to the distance of 3 cables. As before stated, landing is difficult on this coast even in native boats.

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Chart, 2,760 [2,534].
Lat 2° 54′ N.
Long. 97° 24½′ E.
Var. 0° 10′ E.

Pulo Manker, a low sandy islet surrounded by a coral reef, the whole being about 4 cables in diameter, lies about one mile from the coast; the passage between has depths of 6½ fathoms, and is generally used by vessels from the northward when proceeding to Bakongan bay.

Off-lying dangers.—A sandbank, just above water, surrounded by a coral reef about 4 cables in diameter, lies one mile, S.E. by E., from pulo Manker; it is usually discernible by the surf over it.

Lat. 2° 52′ N.
Long. 97° 19½′ E.

A reef, with less than 3 fathoms water over it, lies with pulo Manker bearing E. by N. $\frac{7}{8}$ N., distant about 6 miles.

Southward of pulo Manker are the following reefs, all in a general south-west direction from pulo Dua:—A reef, with less than 3 fathoms water over it, lies with pulo Dua bearing N.E. ½ N. about 3½ miles; a reef with about same depth, with the islet N.E. $\frac{1}{8}$ N. about 6½ miles; two reefs lying close together on the latter bearing, distant 8½ miles; and

Lat. 2° 46′ N.
Long. 97° 20½′ E.

a reef with less than 5 fathoms water over it, with the islet N.E. ¼ E. about 12 miles.

Bakongan bay is a slight indentation on the coast between Manker point and Pulu point, about 5½ miles apart. It affords shelter from north-west winds, with good anchorage in 13 to 15 fathoms water, over mud, off Bakongan village and half a mile from the shore. Coming from the northward pass between pulo Manker and the shore, and coast along within the distance of 4 cables; from the southward pass between pulo Dua and pulo Kaju, thence to the anchorage off the village.

Dangers. — The following dangers lie in the approach to the anchorage:—

A reef with a depth of one fathom over it, lies with Bakongan village bearing N.N.E. $\frac{7}{8}$ E. distant one mile; a similar reef with the village N. ¾ E., $1\frac{1}{10}$ miles, and a reef, with a depth of 2 fathoms over it, with the village N. $\frac{5}{8}$ W., distant 1½ miles.

A reef, about 150 yards long, in a north and south direction, and 75 yards broad, with 15 feet water over it, lies with the west point of pulo Dua bearing N. ¾ E. distant 5 cables; the water is not discoloured, but a rippling may be seen with a slight swell.

A reef, with 2 fathoms water over it, lies between pulo Dua and pulo Ara, and 5 cables S.S.E. ⅔ E. of pulo Kaju, a reef named Gosong Gila, breaks with a slight swell, and shows by discolouration.

A coral reef, with 11 feet least water over it, lies 5 cables N.W. ½ W. from Gosong Gila, with the west point of pulo Ara bearing S.W. by W.; it does not break, nor always show discoloured water.

A reef with 3 fathoms water over, and 16 fathoms around it, lies close westward of pulo Dua, with the north point of that islet bearing E. ¾ N. and the south point of pulo Kaju S.E. $\frac{5}{8}$ E.

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Pulo Dua and pulo Kaju are low sand islets covered with vegetation; there are a few inhabitants on each, engaged in the cultivation of cocoa-nuts. The summits of the trees render the islets conspicuous. The islets are each surrounded by a coral reef and the channel between them is one cable wide with a depth of 10 fathoms in the fairway; the reefs are sharply defined by surf and discolouration which render the passage easy of navigation. On the coast abreast lies Dua village, with anchorage in a depth of 12 fathoms abreast it. Chart, 2,760 [2,534]. Lat. 2° 52½′ N. Long 97° 29′ E. Var. 0° 10′ E.

Pulo Ara is a sandbank just above water, situated nearly S.W. by S., distant 7 cables from pulo Kaju.

Sibadi is a village in the bight 2 miles eastward of pulo Dua, between the two low points of Dusalim and Sedekat. There is good anchorage at about half a mile off shore in from 5 to 6 fathoms water. Both points of the bay have reefs around them to a short distance. Silekat village is situated in the bight eastward of Sedekat point, whence the coast trends south to Trumon. Plan, 2,760 [2,534] Lat. 2° 58′ N. Long. 97° 31¼′ E.

Dangers.—A reef with 10 feet water over it lies about one mile south-westward of Silekat village, and about half a mile south-east of it there is another with a depth of 2 feet; both are about 7 cables from the coast.

A reef about half a mile in extent, with 1½ fathoms water over it, and surrounded by depths of 8 fathoms, lies with pulo Trumon bearing S.S.E. ⅛ E., distant 3 miles; the sea usually breaks over these.

TRUMON.—Pulo Trumon is a very low islet overgrown with brushwood and having a few cocoa-nut trees, which renders it visible when some miles distant; a reef from 50 to 100 yards wide encircles it. The islet is about 2 miles westward of Trumon village, which has a considerable trade in pepper. Lat. 2° 43′ N. Long. 97° 35′ E.

The river is only navigable by native boats, and there is usually a heavy surf on the bar and along the coast.

Anchorage.—Directions.—The anchorage off the village is not safe during north-west to south-west winds, as the swell is troublesome even when in a depth of 8 fathoms; light craft seek protection from these winds under the lee of pulo Trumon, in about 6 fathoms water. Coming from the northward, the islet may be approached when bearing about E.S.E., passing northward of it at a prudent distance; a spit extends half a cable off its north end. Trumon peak, in clear weather, and Kokohan peak (page 290), are good marks from the offing.

From the southward, keep close along shore, within the shoals extending about 6½ miles southward of pulo Trumon, having avoided the charted off-lying dangers. The lead is a good guide, and depths of 5 to 6 fathoms should be maintained.

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Chart, 2,760 [2,534]. Lat. 2° 47′ N. Long. 97° 32′ E. Var. 0° 10′ E.

Dangers. — The following dangers lie in the vicinity of pulo Trumon, and on the following bearings and distances from it :—

A reef with less than 3 fathoms water over it, W. $\frac{1}{8}$ N., distant one mile.

A bank, with less than 3 fathoms over it and surrounded by depths of 7 and 8 fathoms, W. by S. $\frac{2}{3}$ S., distant $2\frac{1}{2}$ miles.

Discoloured water reported W. by S. $\frac{1}{8}$ S., distant 5 miles.

A reef, with 4 fathoms water over it, S.S.W. $\frac{7}{8}$ W., distant $1\frac{2}{10}$ miles.

A reef, with 4 feet least water over it, about 3 cables in length in an east and west direction and 2 cables north and south, S. by E. $\frac{1}{8}$ E., distant one mile, with pulo Trumon in line with mount Pintorimba.

A reef, with a depth of $4\frac{1}{4}$ fathoms over it, S.E. $\frac{1}{8}$ S., distant one mile.

A large reef, named Medang Ara, on which is a rock awash, S. $\frac{1}{2}$ W., distant from 2 to 3 miles. Eastward of Medang Ara reef, and outside the 5-fathoms contour line, there are some patches of $3\frac{1}{2}$ to 5 fathoms, otherwise the depths in the channel are from 6 to 7 fathoms.

A reef, with 4 fathoms water over it, S. $\frac{3}{8}$ E., distant 4 miles.

A reef, about 2 cables in length north and south and $1\frac{1}{2}$ cables in breadth, with a least depth of 17 feet over it, S. by E. $\frac{1}{2}$ E., distant $4\frac{7}{10}$ miles from the island.

Lat. 2° 41½′ N. Long. 97° 36′ E.

Ajer Hitam reef, on which the depth is $1\frac{1}{2}$ fathoms, with 7 and 8 fathoms around it, is circular and about 4 cables in diameter; pulo Trumon, distant $6\frac{1}{2}$ miles, in line with mount Pintorimba, bearing N. by W., leads over the west side of the reef.

Discoloured water is charted S. by W. $\frac{3}{4}$ W., $6\frac{1}{2}$ miles from pulo Trumon.

These reefs are "steep-to," the shallower ones occasionally break, and no dangers are known between these reefs and the main island, the depths, in the fairway, being from 5 to 7 fathoms.

Buoy.—The eastern side of Ajer Hitam reef is marked by a nun buoy painted white, and surmounted by a staff and ball.

Lat. 2° 44½′ N. Long. 96° 57′ E.

Princess Amelia reefs, three patches usually marked by surf or discoloured water, are "steep-to," and lie with Trumon island bearing E. $\frac{1}{2}$ N., distant 38 miles; E. by N. $\frac{1}{8}$ N. 31 miles; and E. by N. 29 miles. A good look-out aloft should be kept when navigating off all this coast, as before stated.

Lat. 2° 37½′ N. Long. 97° 33′ E.

Heria reef, with less than 3 fathoms over, and deep water around, it, lies about 6 miles off shore, with pulo Trumon bearing N. $\frac{5}{8}$ E., distant 10 miles.

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Karang Laut, a reef with less than 3 fathoms water over it, lies with Bula Sama river entrance bearing E. by S., distant 3½ miles. Chart, 2,760 [2,534]. Lat. 2° 29′ N. Long. 97° 35¼′ E. Var. 0° 10′ E.

Buoy.—A nun buoy, painted white and surmounted by a staff and ball, is moored, in 10 fathoms water, eastward of the reef.

Ambonia reef, with a depth of 2½ fathoms over it, lies with pulo Jawi Jawi bearing S.S.W. ⅓ W., distant 6 miles.

A reef, with less than 3 fathoms water over it, lies one mile northward of the mouth of the Ajer Itam, at about 5 cables off shore.

A reef, seen to break, was reported in 1894, at about 21 miles westward of Bula Sama, and a depth of 10 fathoms, over hard bottom, was obtained E. by S. ½ S. distant 27 miles from this position. Lat. 2° 36′ N. Long. 97° 17′ E.

BANJAK ISLANDS consist of a group of islands extending about 42 miles westward of Singkel, the three largest being pulo Tunangku, pulo Bangkaru, and pulo Ujong Batu, besides which there are many islets with deep water channels interspersed with rocks, between them. Plan, 855 [2,537].

The population, consisting of some Achinese and Niassers, is scattered; they subsist mostly on rice, sago and cocoa-nuts.

Pulo Bangkaru, the outer and south-western islet, is high in its main part and at its south point, and the lower land between makes it appear, from a distance, as two islands; a reef lying 7 cables off its west side, dries in places. Lat. 2° 4′ N. Long. 97° 5′ E.

Anchorage.—Chameleon bay, on its south-east side, affords sheltered anchorage from N.W. and westerly winds in depths of from 19 to 20 fathoms. A small stream runs down from the north side of the bay, but the water is not good.

Reefs.—A reef, with a depth of 2 fathoms over it, is situated with the southern point of pulo Bangkaru bearing S.W. by W. ⅞ W., distant 1¼ miles, and the eastern point of the same island N. by E. ⅞ E. This reef is about 4½ cables long in an E.N.E. and W.S.W. direction, and one cable wide. There are depths of from 7 to 9 fathoms between it and the coast.

A reef, with a depth of 5 fathoms over it, is situated with the southern point of pulo Bangkaru island bearing S.W. by W. ½ W., distant 2¼ miles, and the eastern point of the same island N. ⅞ E. There are depths of 15 fathoms around this reef.

Between pulo Bangkaru and pulo Tapak, 24 miles to the westward, the channel is considered to be free from danger; but it is recommended to keep to the Bangkaru side.

The channel between pulo Bangkaru and Tunangku is nearly 5 miles wide with deep water, there being no danger apparently beyond half a mile from either island.

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Chart,855 [2,537].
Var. 0° 10′ E.

Pulo Tunangku, the largest island, is about 17 miles in length in a north-west and south-east direction; on its northern and western sides it is hilly and mountainous, but on the east side low and overgrown with mangroves, with several bays in which there is sufficient depth of water, but the channels leading to them between outlying reefs are mostly dangerous.

Lat. 2° 13′ N.
Long. 97° 16′ E.

Gunong Tambaga, on the north point of the northernmost bay, is dark-coloured and conical shaped, and pulo Pangulu and pulo Dua, lying off this bay, are both high and wooded; pulo Samut, a small island to the southward of the above, may be recognised by its dark colour.

An island situated close to the south point appears to be connected with it when seen from the eastward or westward; to the eastward of it lies pulo Pinang.

The west coast of the island is generally steep, with some high hills and points.

Naveh bay, on the west coast, about 9 miles from the south point, has a high table-topped hill on the north side of the entrance. The depths at the entrance are from 10 to 11 fathoms, decreasing gradually to 3 and 4 fathoms, over sand and mud, and good anchorage may be obtained in the latter depth; two small rivers run into the bay.

Lat. 2° 13′ N.
Long. 97° 4½′ E.

Coast.—Tanjong Selinga, the north-west point of the island, extends from Gunong Batu Lanteh, terminating in a low point. The north coast is mountainous and fronted by numerous islands and dangers; Gunong Batu Lanteh, 780 feet, and Gunong Trusa, 1,000 feet above high water, are two conspicuous hills on this coast; the latter has a sugar-loafed peak.

Dangers.—A bank, with 2 fathoms water over it, lies N.W. $\frac{1}{8}$ W. distant one mile from the point of Gunong Batu Lanteh, and depths of 6 to 8 fathoms are charted near it.

A shoal with 7 fathoms water lies with pulo Timbarat bearing E. by N. $\frac{3}{4}$ N. distant about 3 miles; another with the same depth is situated 2 miles south-eastward of it, and others may exist near it.

For other dangers *see* the Admiralty Chart.

Anchorage.—Eastward of Gunong Batu Lanteh there is a bay, on the east side of which is Tunangku village, off which good anchorage may be obtained, in from 6 to 7 fathoms water, over soft ground, and about half a mile westward of the south point of pulo Simo.

Directions.—Approaching this anchorage from the westward it is recommended to steer along the north coast of the island, passing southward of the 2-fathoms bank already mentioned, the channel having a depth of about 10 fathoms.

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Pulo Ujong Batu lies nearly 9 miles north-eastward of Tunangku and is about 5 miles in length, with islets extending about the same distance southward. Chart, 855 [2,537]. Var. 0° 10′ E.

Between the numerous islets and reefs extending about 6 miles north-eastward of the northern portion of pulo Tunangku and pulo Ujong Batu, is a deep channel about 3 miles in width, which turns to the eastward between the islets southward of pulo Ujong Batu and Great pulo Balambak.

Eastward of the reefs extending about 2 miles north-eastward of pulo Ujong Batu, is a channel nearly 4 miles wide, said to be one of the best passages between the Banjak islands, but there are two shallow heads charted in the fairway and two others of which the positions are doubtful. *See* directions for Outer channels, page 306.

Pulo Jawi Jawi or Passage island, the north-eastward of the Banjak islands, lies 10 miles east-north-eastward of pulo Ujong Batu, and 7 miles westward of tanjong Palikala on the Sumatra coast; it is low and sandy with a few shrubs, and may be seen from a distance of 8 miles. Jawi Jawi is situated on the east end of a reef which is 5 miles in length in an east and west direction, and 3 miles in breadth. There is a deep channel, about $1\frac{1}{2}$ miles wide, between it and the shoals fronting the main island, with a patch, on which the depth is $4\frac{1}{2}$ fathoms, lying N. by E. $\frac{3}{8}$ E., distant $1\frac{1}{2}$ miles from pulo Jawi Jawi and in the northern approach. Lat. 2° 23½′ N. Long. 97° 32′ E.

The shoals, which lie eastward of the deep water channel and occupy a space of $3\frac{1}{2}$ miles in breadth between pulo Jawi Jawi and tanjong Palikala, have on their eastern side a reef, between which and tanjong Palikala there is a channel $1\frac{2}{10}$ miles in breadth.

Buoy.—The reef above-mentioned is marked, on its eastern side, by a nun buoy, painted white and surmounted by a staff and ball, which is moored, in 9 fathoms water, with Palikala river entrance bearing E. by S. $\frac{5}{8}$ S., distant $2\frac{3}{10}$ miles. Lat. 2° 24′ N. Long. 97° 37′ E.

Directions.—Vessels from the northward bound to any of the ports north of the equator should proceed by one of the passages between Banjak islands and the Sumatra coast. That close along the coast of Sumatra is reported to be safe, but the one close eastward of pulo Jawi Jawi is usually taken.

Jawi Jawi channel.—In steering for this channel keep about 9 or 10 miles off the coast until pulo Jawi Jawi is seen, then steer towards it, observing never to bring it to bear more easterly than S.E, to avoid getting near the shoals and irregular depths, extending about 5 miles to the westward of it.

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Chart, 855 [2,537]. Var. 0° 10′ E.

Having approached pulo Jawi Jawi within a distance of 3 miles, bring it to bear S.S.E., which will lead westward of the 4½ fathoms patch, and when three-quarters or half a mile off the island, alter course to pass about that distance eastward of it, to avoid the shoals midway between it and tanjong Palikala. The reef encircling pulo Jawi Jawi is dry all round to the distance of a cable at low water, and projects about a quarter of a mile, or rather more in some places, but is not visible at high water. By preserving the distance mentioned the depths will be tolerably regular, and never less than 10 or 12 fathoms, mostly rocky bottom.

A good look-out from the masthead is requisite when passing through this channel, as the coral shoals may be discerned in clear weather, but the flat surrounding pulo Jawi Jawi cannot always be distinguished. When through the channel, which is about 2 miles in length, the island must be kept between the bearings of N.N.W. and N.W. by N., astern, as within these bearings a vessel may anchor if the wind or tidal stream be unfavourable; but northward of the island anchorage should not be taken up under 20 fathoms, for the ground there is rocky under that depth.

Inshore channel.—Coming from the northward and having passed inside Karang Laut, tanjong Palikala steered for bearing about S. by E. ¼ E. should lead between Ambonia reef and the coast; tanjong Palikala has depths of from 7 to 8 fathoms about a cable off it, and the channel between it and the buoy (*see* page 305), marking the eastern reef from pulo Jawi Jawi, is a mile wide. Having passed this, bring tanjong Palikala to bear N. ⅞ W. astern and steering S ⅞ E. will lead eastward of Arumpanjang, and westward of the buoy marking Singkel spit.

Lat. 2° 24½′ N. Long. 97° 38½′ E.

Outer channels.—There is a channel nearly 4 miles wide, with depths of 17 to 30 fathoms, between pulo Jawi Jawi reef and the reef extending north-eastward of pulo Ujong Batu. In approaching from the northward, bring Little pulo Balambak to bear S. ⅝ E, which bearing being preserved will lead through in deep water. A good look-out should be kept from the masthead for uncharted dangers.

The channel between pulo Ujong Batu and pulo Kassik, appears easy of navigation, though the chart of the Netherlands Government Survey of 1876 does not show soundings in its northern approach. From the northward, pulo Kassik may be approached bearing S. by E., and when within 2 miles of it, course should be altered to pass one mile westward and southward of Great pulo Rongit; when the latter bears N. ½ E., steer E. ½ N., keeping Gunong Trusa open northward of the two islets situated on the north-west part of the flat extending from pulo Balambak, bearing

General chart, 2,760 [2,534].

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about West. (*See* view on plan.) When Little pulo Balambak bears S by W., course may be altered to the south-eastward. Chart, 855 [2,537]. Var. 0° 10′ E.

SINGKEL.—The town of Singkel, situated eastward of Banjak islands, was formerly a place of considerable trade, the principal exports being benzoin, camphor, wax, and gold. It stands on an island within the mouth of the river, nearly encircled by a low and narrow peninsula, forming its right bank. Singkel point, the west point of Singkel road, is continually changing. Lat. 2° 16¾′ N. Long. 97° 44¾′ E.

Communication.—The Netherlands Royal Packet Company's steamers running between Padang, Penang, and Singapore call fortnightly; telegraph by land lines to Tapanuli and to other ports. (*See* Chapter I., page 21.)

Supplies of fresh provisions, in small quantities, may be procured and good water obtained.

Dangers.—Arumpanjang reef, about 100 yards in extent, with 4 fathoms least water over it, is surrounded by depths of 13 and 14 fathoms, and lies with Palikala point bearing N. by E., distant $6\frac{1}{10}$ miles.

Singkel spit, a long sandbank stretching about 2½ miles south-westward from Singkel point, is said to be extending and dangerous to approach, and should therefore be given a wide berth.

Buoy.—A nun buoy, painted black and surmounted by a staff and ball, is moored, in 12 fathoms water, on the south-west edge of the spit.

Daphne reef, about 250 yards in extent, with 9 feet water over it, and composed of coral and stones, is "steep-to," being surrounded by depths of from 11 to 14 fathoms; it lies with tanjong Palikala in line with Singkel point, bearing N.N.W. $\frac{5}{8}$ W. and tanjong Bawang E. $\frac{1}{2}$ N. It seldom breaks, and only shows with a westerly or south-west swell. Lat. 2° 14′ N. Long. 97° 45′ E.

Buoy.—A nun buoy, painted black and white in horizontal stripes, is moored, in 6 fathoms water, on the north side of the reef.

Singkel river is, for the purposes of navigation, the largest river on the west coast of Sumatra, but the channels are subject to continual changes. The depths in the river to where it is joined by the Simpang Kanan and Simpang Kiri, are from 10 feet to 4 fathoms, and the breadth from 250 to 300 yards. In the Simpang Kanan the depths are from 6 to 10 fathoms, and the breadth from 100 to 150 yards; the Simpang Kiri has depths of from 3 to 10 feet.

Singkel road, a bight formed between Singkel point and tanjong Bawang, is about 2 miles in breadth with depths of from 6 to 8 fathoms, and open to winds between S.S.W. and S.E.

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Chart, 855 [2,537]. Var. 0° 10′ E.

Reefs which break project a short distance from the entrance points of the inlet. No armed natives should be permitted on board, and caution is necessary in dealing with them.

Anchorage may be obtained in from 8 to 9 fathoms water, over mud and good holding ground, south-eastward of the mouth of the river and about one mile from the north side of the road.

Directions.—A vessel bound to Singkel from the northward should, when southward of pulo Jawi Jawi, bring it to bear N.W. $\frac{1}{4}$ N., astern, which leads about one mile westward of Arumpanjang reef and of the buoy marking Singkel spit; and having passed it, course may be shaped to pass between Daphne reef and the spit.

Or coming by the inner route, tanjong Palikala kept astern, bearing N. $\frac{7}{8}$ W., will lead eastward of Arumpanjang reef to Singkel spit buoy.

Chart, 2,760 [2,534].

Si Muara Gosong Telaga bay is situated about 9 miles eastward of Singkel, tanjong Bawang forming its west point.

Lat. 2° 13¼′ N. Long. 97° 53′ E.

Pulo Kassi, 2½ miles W. by S. ½ S. from tanjong Bawang, is merely a low sandbank which breaks at high water, and northward of it in the bay is an island covered with trees, named Telaga or Tuangku, situated south-westward of a sandbank.

Pabiharan island, 7 miles eastward of pulo Kassi, is low, thickly overgrown, has cocoa-nut trees growing on it, and is surrounded by a broad reef.

Landing is difficult in the bay as the whole coast is generally breaking, but it may be effected eastward of tanjong Bawang.

Anchorages.—A vessel, intending to remain a considerable time, should anchor in 5 fathoms water, over mud, on the west side of the Telaga island, being here sheltered by the land from westerly winds and by the reefs at the entrance of the bay from south-east winds.

The channel between Pabiharan island and the shore is safe and affords anchorage, sheltered from West and S.W. winds, in a depth of about 8 fathoms.

Directions.—In approaching from the westward, tanjong Bawang, the west point of the bay, should be passed in depths of 8 or 9 fathoms, over hard bottom, to avoid the flat which extends about a mile off it. Eastward of the point the bottom becomes soft, when course should be altered to N.N.E. to pass westward of pulo Kassi.

Lat. 2° 6½′ N. Long. 98° 8½′ E.

Pulo Panjang, situated 19 miles east-south-eastward of tanjong Bawang, has good anchorage against all winds, in 5½ fathoms water, between it and the shore; the island should have a berth of 3 cables when entering, to avoid a small reef off it.

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Dangers.—The following are the outermost dangers off the coast between Singkel and Silabi point, on the north-east side of the channel between them and the reefs lying north-eastward of pulo Lakotta; this channel forms the best route along the coast. Between the following dangers and the shore, there are numerous reefs, the positions of which will be best seen by reference to the Admiralty chart. Chart, 2,769 [2,534]. Var. 0° 10′ E.

South Daphne reef, which lies about 5½ miles, south-south-east of tanjong Bawang, consists of two reefs about a mile apart in an east-north-east and west-south-west direction; each has 2½ fathoms water over it, and there is a depth of 7 fathoms between. Lat. 2° 8½′ N. Long. 97° 52′ E.

Buoy.—A nun buoy, painted black, and surmounted by a staff and ball, is moored, in 7 fathoms water, westward of the reef.

Janus reef, composed of coral, with less than 3 fathoms water over it and showing discoloured water, lies E. ½ S., distant 1½ miles from South Daphne reef, and between are two coral patches having depths of 2 fathoms over them.

Haai reef, S. by W. ⅓ W. distant about 3 miles from Pabiharan island, has a reported depth of 6 fathoms over it, but as the bottom was seen there is possibly a less depth. Half a mile, N. by W. of it, there is a sand bank from which Pabiharan island bears N N.E. ⅞ E., distant 2 miles, and 2 cables, in an east-south-east direction from this bank, there is a breaking rock. Northward of this danger are two reefs which show discoloured water; the eastern is 1½ miles southward of Sikandang island.

Kameleon reef, on which discoloured water shows plainly, lies with Pabiharan island bearing N. ⅛ W. and pulo Panjang E. ⅝ N. Haai reef lies 3 miles, N.N.W., of the foregoing, but the least depths on these reefs are not given. Lat. 2° 6′ N. Long. 98° 0′ E.

Hippomene reef, on which a vessel of the same name struck, lies with Pabiharan island bearing N. by W. ⅜ W. and pulo Pandang E. by N. ⅔ N. Annadyomene reef, of coral, on which the depth is 4¾ fathoms, lies N. by E. ½ E. distant 5 cables from Hippomene reef.

Doris reef, with 3 fathoms water over it, lies with Pabiharan island bearing N. by W. ¾ W. and pulo Pandang N.E. ¾ E. Lat. 2° 3′ N. Long. 98° 3′ E.

Argo reef, with 6 fathoms water over it, lies with pulo Panjang bearing N.E. ⅛ E. and Silabi point E. ⅓ S. A reef, on which the depth is 2¾ fathoms, over coral, lies N. by W. ½ W. distant 1 7/10 miles from Argo reef.

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Chart, 2,760 [2,534].
Lat. 2° 2½′ N.
Long. 98° 6½′ E.
Var. 0° 10′ E.

Boreas reef, with 2½ fathoms least water over it, is situated with pulo Pandang bearing N. by E. ⅔ E. and Silabi point E. ⅛ S. Van Speyk reef, with a depth of 7½ fathoms, lies S. by E. ¼ E. distant 5 cables from Boreas reef.

Lat. 1° 51½′ N.
Long. 97° 59′ E.

Pulo Lakotta, situated S.E. by S., distant 29 miles south-eastward from Singkel point, is a small low island, covered with trees, one of which may be seen from a distance of 12 miles. Nicobar pigeons frequent this island in great numbers.

Lat. 1° 56½′ N.
Long. 97° 58′ E.

Pulo Burong, a low islet or really sandbank, situated 5 miles, N. ⅝ W., of Lakotta, is surrounded by a reef which is three-quarters of a mile in length in an east and west direction, and may be often seen breaking.

Dangers.—The following dangers lie northward and eastward of pulo Burong :—

A reef, the existence of which is doubtful, is charted N.W. ½ W., distant 12 miles from the island.

A patch of discoloured water, breaking, was reported to lie N.W. ⅛ W., distant 3½ miles from pulo Burong.

A reef, with 2½ fathoms least water over it, lies E. by N. ⅛ N., distant 3½ miles from pulo Burong.

Northward and eastward of pulo Lakotta are the following dangers :—

A reef, with 1½ fathoms water over it, which sometimes breaks, N.N.W. ⅔ W., distant 2 miles from the island.

A bank, with 5 fathoms least water over it, N. ¾ E., distant 3 miles from the island.

A reef, on which the depth is 4 fathoms, N.E. by N., distant 3½ miles from the island.

A reef, with 5 fathoms water over it, N.E. ⅛ N., distant 6 miles from the island.

The space to the west and south-west of pulo Lakotta is unsurveyed.

Lat. 1° 54′ N.
Long. 98° 5′ E.

Maha Vaijirunhus reef, of rock and coral, with a least depth of 4¼ fathoms, lies E. by N. ⅞ N., distant 6 miles from pulo Lakotta.

A reef, which breaks, lies 6 miles East of pulo Lakotta.

Lat. 1° 47′ N.
Long. 98° 5′ E.

Argo reef (depth not stated) lies with pulo Lakotta bearing N.W. by W. ⅛ W., distant 7 miles.

Reefs are situated in the following positions from Argo reef :—E. ¾ S., distant 2½ miles, and N.E. ½ E. the same distance; both these reefs break.

A reef, with about 3 fathoms least water over it, E. ¼ N., distant 5½ miles.

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Makasser reef, with a depth of 4 fathoms over it and showing by discoloured water, lies S.W. by W. $\frac{7}{8}$ W., distant $2\frac{1}{2}$ miles from pulo Lakotta, and 2 miles south-west of it there is a reef, 3 cables in length in a north-east and south-west direction, 2 cables in breadth and having a similar depth over coral; from this reef pulo Lakotta bears N.E. $\frac{1}{8}$ E., distant 4 miles. Chart, 2,760 [2,534]. Lat. 1° 50′ N. Long. 97° 57½′ E. Var. 0° 10′ E.

A sandbank, with discoloured water, has been reported to lie with pulo Lakotta bearing N. $\frac{3}{4}$ E., distant $8\frac{1}{2}$ miles, and another, 2 miles south-east of the preceding bank, distant 10 miles from pulo Lakotta. Lat. 1° 42′ N. Long. 97° 58′ E.

TAPUS ROAD.—Silabi point, lying 26 miles south-eastward of tanjong Bawang, is the west point of Tapus road, which is considered to be a better anchorage than Baros, 5 miles further eastward; a flagstaff is situated at the mouth of the river, which is in the north part of the road. Plan, 855 [2,537]. Lat. 2° 3½′ N. Long. 98° 15′ E.

The entrance to the river and the east side, where Tapus village stands, is nearly dry at low water, and round the bay a shallow flat of sand and mud extends for nearly half a mile, where the depth is 3 fathoms.

Supplies.—Wood and water may be obtained here.

Dangers.—Raja Udat di Luar reef, about a cable in diameter and with $4\frac{1}{2}$ fathoms least water over it, is composed of coral and rock and lies with the east point of pulo Panjang bearing N.N.W. $\frac{1}{8}$ W. and the north point of pulo Karang E. $\frac{3}{4}$ N.; it is surrounded by depths of from 19 to 21 fathoms. Chart, 2,760 [2,534]. Lat 1° 58′ N. Long. 98° 13′ E.

Buoy.—A nun buoy, painted black and surmounted by a staff and ball, is moored, in 6 fathoms water, off the south-west edge of the reef.

Raja Udat di Tenga reef, about a cable in diameter and with 4 fathoms least water, is composed of coral and rock and situated with pulo Pandang bearing N.N.W. $\frac{2}{3}$ W. and the south point of pulo Karang, East.

Two reefs about the same size, but with a depth of 6 fathoms over them, lies N. $\frac{1}{2}$ W. distant 2 cables from the foregoing with a depth of 20 fathoms between them.

Triton reef, with 2 fathoms least water, over coral, lies with pulo Panjang bearing N.W. $\frac{1}{8}$ N. and the south point of pulo Karang E. by S.

Ujong Binoang reef, a triangular-shaped shoal about 3 cables in length at its base, which is to seaward, has less than 2 fathoms water over it and lies on the east side of Tapus road, about one mile south of the river mouth and the flagstaff. Plan, 855 [2,537]

Anchorage may be obtained in from 4 to 6 fathoms water, over sand and mud, about one mile, S.W. by S., of the flagstaff.

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Plan, 2,760 [2,534]. Lat. 2° 1′ N. Long. 98° 21′ E. Var. 0° 10′ E.

BAROS, an open port, and at the mouth of the Batu Garigis river, is a place of some trade. Point Karang, a tongue of land projecting to the south-west and fringed with a coast reef, forms the west side of the road, and on the east side is a sandbank stretching, for nearly 1½ miles, in a south-west direction from Baros.

Communication.—The Netherlands Royal Packet Company's steamers running between Padang, Penang and Singapore call every fortnight, and there is telegraphic communication. (*See* Chapter I., page 21.)

Water.—Fresh water may be procured, but it is imprudent for a boat to enter the river without a native guide. (*See* Caution regarding Natives, page 269.)

Trade.—The principal exports are camphor, india-rubber, buffalo hides and benzoin.

Lat. 1° 59′ N. Long. 98° 19′ E.

Karang island, low, wooded, and with a small sandy beach on its eastern side, lies 1½ miles southward of point Karang, and has a shoal, with 2½ fathoms water over it, about 3 cables off its south-west point and Siwa reef, on which the depth is 4 feet, about the same distance off its north-west side.

Anchorage.—The road is open and unsafe and landing difficult. The usual anchorage is about 5 cables eastward of Karang island in about 10 fathoms water, over mud; or closer in, in 4 fathoms, with point Karang bearing W. by N. ⅞ N. and the flagstaff at Baros N. by E. ½ E.

Directions.—The best route between Singkel and Baros is passing south-west of South Daphne reef; the outermost reefs off the coast and Raja Udat di Luar reef. (*See* page 311.)

Tides.—It is high water, full and change, at Baros at 7h. 0m.: springs rise about 3 feet, neaps range half a foot.

Chart, 2,760 [2,534]. Lat. 1° 57′ N. Long. 98° 28′ E.

COAST.—Tanjong Pannee is situated 15 miles south-eastward of Silabi point and has Bilalang and Paneh, two small, low islands, lying on the coast reef near it on which the sea is always breaking. Between these and pulo Sorkam the 5-fathoms contour line is 2 miles off-shore, and within it are two reefs which break.

Lat. 2° 17′ N. Long. 98° 11½′ E.

Mountains.—Van Maurikberg is situated N. by W. ¾ W. from Tapus and 9 miles from the coast; Gunong Toba, 6,560 feet above high water 17 miles east-south-eastward from Van Maurikberg and N.E. ⅛ N. from Baros, is 14 miles from the coast, and Gunong Semanampalu, 3,543 feet above high water, lies 8½ miles, S. by W. from Gunong Toba; E. by N. ⅔ N. from Baros, and 3 miles inland. *See* page 326.

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Pulo Sorkam, small, low and surrounded by a coast reef "steep-to," which breaks heavily on its south-west side, lies 14 miles, south-east of pulo Kərang and 2 miles off the coast; the channel between the island and the shore has depths of from 3½ to 6 fathoms, keeping on the island side. Chart. 2,760 [2,534]. Lat. 1° 52′ N. Long. 98° 30½′ E. Var. 0° 10′ E.

Anchorage.—There is good anchorage eastward of pulo Sorkam over clay and sand.

Water may be procured from Sorkam river abreast the island.

TAPANULI (Siboga) BAY, between tanjong Batu Buro and tanjong Mama, its entrance points, is 9 miles wide and forms the most sheltered and secure anchorage on the west coast of Sumatra. Tanjong Batu Buro, the northern point, is of considerable height. Plan, 855 [2,537].

Pulo Nassie Satunkus, or Sugar Loaf, a conical-shaped islet, 800 feet above high water, lies 1½ miles off tanjong Mama, and is a conspicuous object when approaching or leaving Tapanuli bay by the southern channel. The west side of pulo Nassie Satunkus is clear of danger with a small sandy beach, but the eastern side is surrounded by a coast reef, and south-east of the island are some small rocks named Sambal. Lat. 1° 36′ N. Long. 98° 40′ E.

Pulo Bakal, lying half a cable northward of tanjong Mama, is a small, thickly wooded, rocky island with a reef extending from its north and west sides, and a good landing place on the east side.

Anchorage.—Good anchorage may be obtained S.E. by E. of the island in 16 fathoms water.

Pulo Onggeh, 2 miles eastward of pulo Bakal and one mile from the shore, is a small low island covered with cocoa-nut palms, surrounded, on its western side, by a coral reef and having a bank of sand and coral extending half a mile from its eastern side.

Diaga Diaga village is about a mile north-eastward of Gunong Kebang, 1,224 feet; and Sibuluang village, 5 miles to the northward, is on the north side of the bay, southward of Gunong Tambak Raja, 1,512 feet above high water.

Channels.—The northern channel between pulo Mansalar and the Sumatra coast, leading to Tapanuli bay, is 7 miles wide, with depths of from 12 to 18 fathoms on either side of Banda reef.

The southern channel, between pulo Mansalar group and pulo Nassie Satunkus, is 5 miles in breadth, free from danger, with regular depths of about 24 fathoms.

Karang Gadang, with 9 feet least water over it, lies 1½ miles off shore and S.E. ⅝ E., distant 5½ miles from pulo Sorkam. Lat. 1° 48′ N. Long. 98° 35′ E.

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Plan, 855 [2,537]. Lat. 1° 45′ N. Long. 98° 37′ E. Var. 0° 10′ E.

Argo reef, situated 7 cables from the shore near tanjong Pandang, is about a cable in length in a north-west and south-east direction, and has one fathom water over it; from it pulo Sorkam bears N.W. $\frac{1}{4}$ W., and the north extreme of pulo Mansalar W. by S. $\frac{1}{8}$ S.

Banda reef, lying nearly in mid-channel of the northern entrance, is about 50 yards in extent, has a least depth of 5 fathoms over it and is "steep-to," being surrounded by depths of from 14 to 15 fathoms, over mud; from it the east point of pulo Sorkam bears N.N.W., distant $8\frac{1}{4}$ miles.

A rock with $2\frac{1}{2}$ fathoms water over it, lies 2 cables southward of Karang point and $6\frac{1}{2}$ cables south-west of tanjong Batu Buro, at the entrance to Tapanuli harbour.

Several dangers lie near the coast on the east side of the bay; those westward and northward of Diaga Diaga river have depths of 9 feet over them, and a reef lying about half a mile westward of tanjong Gunong Tua has a depth of 6 feet. As a rule all these reefs break.

Further out in the bay a reef awash and generally breaking lies S.S.W. $\frac{7}{8}$ W., distant $1\frac{1}{2}$ miles from tanjong Gunong Tua and Karang Sibangon, and two reefs lying close together are situated $1\frac{1}{2}$ miles southward of the east point of Ponchang Gedang and $1\frac{2}{10}$ miles from the coast; they are awash at low water and generally break.

Tapanuli harbour, an extensive inlet on the north side of Tapanuli bay, is subdivided into many coves by islands, where a large number of vessels may lie sheltered from all winds.

It is an open port, and the seat of the Dutch resident for the district, but has little commerce; the natives around are barbarous, and the country a mere forest.

Towns. — The town of Tapanuli is at the northern head of the harbour. Siboga, the Dutch Residency, lies on the eastern shore of the outer anchorage, 3 miles southward of Tapanuli.

Lat. 1° 44½′ N. Long. 98° 45¾′ E.

LIGHT.—When steamers lie in the road, or are expected, a *red fixed* light is hoisted on the flagstaff near the pier at Siboga.

Communication.—The Netherlands Royal Packet Company's steamers, running between Padang, Penang and Singapore, call fortnightly, and Siboga has telegraphic communication with Padang and by telephone with the interior. (*See* Chapter I., page 21.)

Coal and supplies.—The Dutch Government have a small supply of coal, the store being on Ponchang Kechil. Poultry and fruit may be

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procured, and fresh water at Siboga in the bay on the north-east side of Ponchang Kechil. Plan, 855 [2,537]. Var. 0° 10′ E.

Islets.—Ponchang Gedang, the largest islet, lies between the entrance points of the harbour, near the eastern shore, and has some steep hills covered with large timber, near the foot of which there are several springs of fresh water. The island is encircled by a reef, on the north side of which lies a small island named Bankee; on the eastern side, the reef is small, but off it lie two reefs, with 3 feet water over them, which show a slight break. Lat. 1° 43′ N. Long. 98° 44′ E.

Ponchang Kechil, small, about 50 feet above high water and covered with cocoa-nut palms, lies nearly one mile north-westward of Ponchang Gedang, with depths of 10 fathoms between; the island is surrounded by a reef, which on the north side is narrow, and here are the coal stores where good landing may be effected.

Beacon.—The eastern point of the shore reef, extending from Ponchang Kechil, is marked by a basket beacon painted black.

Pulo Panjang lies northward of pulo Ponchang Kechil, with depths of 8 fathoms in the channel between. The north end of pulo Panjang is nearly connected to the shore by reefs.

Anchorage.—In the outer portion, eastward of Ponchang Gedang and Ponchang Kechil, there are depths of from 7 to 8 fathoms for about 2 miles in length by one mile in breadth, and there is also good anchorage in 6 to 8 fathoms westward of Ponchang Kechil; the bottom is generally blue mud. The inner harbour, about one mile square, affords anchorage in depths of from 2 to 3 fathoms, with from 3 to 4 fathoms in the narrow approach to it.

Anchorage can also be obtained in 5½ fathoms water, about half a mile from the pier at Siboga. The channel is marked by basket beacons, painted black on the starboard hand and white on the port hand; they stand on the edge of the reefs.

Directions.—Tapanuli bay and harbour may be safely approached by passing on either side of pulo Mansalar group, thence westward of pulo Ponchang Gedang, and on either side of pulo Ponchang Kechil according to circumstances; anchorage may be taken in 7 or 8 fathoms water, over soft bottom, between that islet and Siboga, or in any of the positions previously mentioned.

Tides.—It is high water, full and change, at Tapanuli, at 6 hours: springs rise about 6 feet.

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Plan, 855 [2,537].
Lat. 1° 41½′ N.
Long. 98° 26½′ E
Var. 0° 10′ E.

PULO MANSALAR is 11 miles in length in an east and west direction, and lies in the entrance to Tapanuli bay. The island is high, a conical hill near the north-west end being 1,665 feet above high water, and on the north side are several inlets; the largest, Ronto bay, is 3 miles across, with depths of 15 to 19 fathoms. Near the south-east end of pulo Mansalar is Mansalar bay, having depths of from 16 to 22 fathoms, over soft mud, and fronted by a group of islets. It affords excellent fresh water, and the adjacent islands abound with proa spars, fit for masts or yards of any size that may be required.

Plan, 855 [2,537].

At the north-west end of pulo Mansalar there is a waterfall issuing from a high hill, which forms a good mark when coming from the north-west.

Dangers.—Sumatra reef, marked by breakers, lies W. ⅜ N., distant 7½ miles from tanjong Pinjalang, the south-west point of pulo Mansalar.

Chart, 2,760 [2,534].
Lat. 1° 29′ N.
Long. 98° 9′ E.

Pulo Dua, a small, low islet, is situated S.W. by W., distant 19 miles from tanjong Pinjalang, and the following dangers lie near it:—

A reef, with 1¼ fathoms least water over it, and showing discoloured water, lying N.W. ¼ W., distant 4½ miles from the islet.

A reef, with a least depth of 3½ fathoms over it, situated 2 miles, N.W. ⅛ W. from pulo Dua, and discoloured water was reported N.E. ⅛ N., distant 8½ miles from the islet.

A reef, with 4¾ fathoms water over it, lies E. ½ N., distant 4½ miles from the islet, and E. ⅔ S., distant 6 miles a sandbank, 1½ miles, S.E. ½ E., from the foregoing reef.

A reef, which breaks occasionally, lies E. by N. ⅛ N., distant 6½ miles from the islet.

Lat. 1° 24½′ N.
Long. 98° 13½′ E.

Out-lying islets and dangers.—William III. island, low, barren and small, lies 6½ miles south-eastward from pulo Dua.

William rock, white and above water, on which the sea breaks, lies N.E. by E. ¾ E., distant 8½ miles from William III. island.

Lat. 1° 30′ N.
Long. 98° 22′ E.

Makassar reef, the easternmost of the known dangers in this locality, is 3 cables in length in an east and west direction, has 3 feet least water over it, and always breaks; it lies 2 miles northward of William rock, and from it the west extreme of pulo Mansalar bears about N. by E., and the southern side of pulo Nassie Satunkus E. by N. ½ N. Breakers were seen 3 miles westward of William rock.

Lat. 1° 19′ N.
Long. 98° 17′ E.

Karang Kima (Claudine reef), awash, and of unknown extent, lies about 6 miles south-eastward of William III. island; it generally breaks.

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According to the statement of the natives there are reefs lying between tanjong Lembaru, on pulo Nias, and Karang Kima. Chart, 2,760 [2,534]. Var. 0° 10′ E.

Success reef, having less than 3 fathoms water over it, is "steep to," and lies 27 miles south-eastward of William III. island and 20 miles from the coast. It is about 2 miles in extent, in an east and west direction, does not break, and is therefore dangerous to approach. Lat. 1° 4′ N. Long. 98° 32′ E.

Karang Panjang, a shallow oval reef, 3 miles in length in an east and west direction, and 2 miles in breadth, lies about 11 miles, W. ½ S., of Success reef; it always breaks.

Amelia reef, which occasionally breaks, lies about 5 miles, W. by S. ½ S., from Karang Panjang. A rock which breaks lies 3 miles, S.E. by E., from Amelia reef.

Karang Lawe breaks heavily, and lies about 15 miles south-westward of Success reef, but its position is doubtful. Lat. 0° 52′ N. Long. 98° 22′ E.

Directions.—As other rocks may exist in the vicinity, vessels passing eastward of pulo Dua and William III. island, should keep close over to pulo Mansalar, which is "steep-to," and to the mainland southward of it.

Pulo Ilir, about 13 miles southward of tanjong Mama, is an island near the coast; it is about one mile in length, moderately high, flat and wooded, and affords wood and good water. Lat. 1° 17½′ N. Long. 98° 48′ E.

Anchorage.—There is temporary anchorage, in 8½ fathoms water, between the island and the Sumatra coast, the channel being clear of danger.

Water may be obtained on the island.

TABUJONG ROAD, nearly 30 miles southward of pulo Ilir, is partially sheltered by the Tabujong islands, three in number, lying in a north-west direction from tanjong Tabujong, the south-west point of the roadstead. Gunong Batu Sudong, eastward of the roadstead, is a sugar-loaf shaped hill. Plan, 955 [2,537]. Lat. 0° 52′ N. Long. 99° 0′ E.

Pulo Sikaladi or Tenga, the outer island, is about 3 miles north-west of tanjong Tabujong and Batu Simunu; a small rock above water, surrounded by a shoal, lies 1½ miles beyond it in the same direction; a reef extends in a north-west direction for 7 cables from pulo Sikaladi, leaving a passage 5 cables in breadth, and with depths of from 12 to 13 fathoms, between it and Batu Simunu.

The inner islands are named pulo Tabujong and pulo Labu, which latter is a small sugar-loaf island with some trees on it.

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Plan, 855 [2,537]. Var. 0° 5′ E.

Tabujong village is situated about a mile eastward of tanjong Tabujong, on the north side of the entrance to the river, 7 cables north-west of which there is a small rock above water, surrounded by depths of 3 fathoms. The bar of the river has depths of from 3 to 4 feet over it at low water.

Vessels in passing westward of pulo Sikaladi should give it a berth of 3 miles.

Supplies.—Good water and cocoa-nuts may be obtained from the islands.

Anchorage.—There is anchorage eastward of pulo Sikaladi in depths of from 10 to 11 fathoms, over clay, or in from 4 to 5 fathoms water, over mud, southward of pulo Tabujong; both anchorages are sheltered from N.W. winds, with good holding ground.

Chart, 2,760 [2,534]. Lat. 0° 47′ N. Long. 98° 56′ E.

Ambonia reef, about one cable in length in a north-west and south-east direction and 60 yards in breadth, has a least depth of 1½ fathoms, and lies with tanjong Tabujong bearing N. ⅓ E. and pulo Rinjaman north point E. by S. There is a depth of 6 fathoms close-to, but as the water is not discoloured, caution is necessary in approaching Tabujong road from the southward.

COAST.—The coast between tanjong Tabujong and Karakara point, 15 miles to the southward, is generally avoided, as several shoals lie at a considerable distance from it. Pulo Rinjaman, pulo Tello, and pulo Kapejong are islands fronting this coast within the shoals.

Lat. 0° 44′ N. Long. 99° 15′ E.

Sidoa doa mountain, 6,329 feet above high water, and about 13 miles within the coast line south-westward of Tabujong, is possibly a useful mark in clear weather.

Lat. 0° 42′ N. Long. 98° 55′ E.

Dangers.—Sirene reef, one of the outermost dangers in this locality, consists of three shallow spots, the westernmost of which often breaks, has depths of from 6 to 12 fathoms over it, and lies with pulo Sikaladi, bearing N. ⅝ W. and the southern hill of Karakara E.S.E.

From this reef two patches, with 2 fathoms water over them, and 17 fathoms around, lie S.E. ¾ S., distant one mile, and another with 3 fathoms over it and 16 fathoms around E. by N. ⅛ N.; the two last reefs do not break. There is a passage inshore of the reef, with anchorage, by keeping in 14 and 15 fathoms, but it is preferable to pass outside.

To avoid Sirene reef, a vessel after passing the Tabujong islands at 4 or 5 miles distant should keep Sikaladi island bearing to the eastward of North, and not shoal to less than 23 or 24 fathoms until Gunong Karakara bears E. ¾ S., which will lead 2 or 3 miles seaward of the shoal.

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NATAL ROAD is open and exposed, and has many dangerous shoals; the shore is skirted by a shallow bank, on which a depth of 3 fathoms is found at a general distance of 1½ miles. Plan, 2,760 [2,534]. Var. 0° 5′ E.

Landmarks.—Gunong Karakara, a hill 1,053 feet above high water, showing, when seen from the southward, a long ridge and a sharp peak at the outer end, is situated near the northern extreme of Natal road, and with Bandeira hill is a useful mark for clearing the shoals when entering the roadstead. Lat. 0° 38½′ N. Long. 99° 4′ E.

Bandeira hill or Gunong Natal, about 5 miles south-south-eastward of Gunong Karakara is 374 feet above high water, and situated on the north side of the river: it appears like a wedge when bearing about south-east, and may be known by its barren aspect, and having low land on either side.

Natal stands on the open coast, and was founded by the British in 1762, but with the rest of this portion of Sumatra was relinquished to the Dutch. It is an open port; camphor, benzoin, and gold-dust are the principal articles of export; the imports are opium, iron in flat bars, salt, piece goods of various kinds, stick-lac, and gunpowder.

Communication.—The Netherland Royal Packet Company's steamers running between Padang, Penang and Singapore call here monthly; there is also telegraphic communication. (*See* Chapter I., page 21.)

Dangers westward of Natal.—Karang Kapejong, with 5½ fathoms water over it, and 15 fathoms around, lies 2½ miles westward of pulo Kapejong, with Gunong Karakara bearing E. ⅛ S.

Karang Pemuda, with a depth of 2½ fathoms over it, and surrounded by a depth of 11 fathoms, is situated south-westward of pulo Kapejong, with Gunong Karakara bearing N.E. by E. ½ E., and the flagstaff at Natal S.E. by E. ⅛ E.; a patch, with 6 fathoms water over it, lies 5 cables, S.W. by S, of the reef.

Karakara reef, with from one fathom to 2 fathoms water, over coral, is the only reef in the road which sometimes breaks; it lies with pulo Karakara bearing N.N.E. ⅞ E. distant about one mile. Two patches with depths of 2½ fathoms over them are situated between Karakara reef and island.

Shaftesbury shoal consists of several reefs with depths of from 2 to 4 fathoms over them, covering a space 1½ miles in length by one mile in breadth; the southern reef, named Karang Brambang, has

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Plan, 2,760 [2,534]. Var. 0° 5′ E.

2 fathoms water over it and lies with Gunong Karakara bearing N. ¾ E. and ujong Rakit E. ¾ N.

Karang Tete, with 2½ fathoms water over it, lies one mile westward of the preceding reef, with Gunong Karakara bearing N. by E. ½ E. and Bandeira hill E. by N. ⅜ N.

Karang Kapal, with one fathom least water over its south-east and 2 fathoms over its north-west side, is situated with Gunong Karakara bearing N.N.E. ⅝ E. and the flagstaff at Natal E. by N.

Lat. 0° 34′ N. Long. 98° 57½′ E.

Bayam reef, about 3 cables in length, in an east and west direction, and 2 cables in breadth, is composed of rock and coral and has 2 fathoms least water over it; it lies 7 miles eastward of the centre of the roadstead with pulo Kapejong bearing N.E. by N. and the flagstaff at Natal river E. ¾ S.

Buoy.—A nun buoy, painted black and white in horizontal stripes and surmounted by a staff and ball, is moored, in 5½ fathoms water, on the south-east side of the reef.

Karang Laut with one foot least water over, and 17 fathoms around it, lies with Gunong Karakara bearing N.E. ⅓ N. and the west point of pulo Tamang S.E. ⅓ S.

Lat. 0° 33½′ N. Long. 98° 52½′ E

Sabujong Gedang, over which a depth of 4¼ fathoms has been reported, is situated with Gunong Karakara bearing E.N.E. and the west point of pulo Tamang S.E. ⅛ S. A small reef, with 6 fathoms water over it, not breaking, lies S.S.W. ¼ W., distant 2½ miles from Sabujong Gedang, with Gunong Karakara N.E. by E. ⅓ E.

A reef, with 3 fathoms water over it, which breaks heavily, lies 8 miles, W.S.W., of Sabujong Gedang.

Patches, with less than 5 fathoms water over them, lie 5½ miles west and 4½ miles north of Sabujong Gedang, and Ponjong reef, on which the depth is 8 fathoms, is situated E. ½ S., distant 3 miles from the same danger.

Landing.—The landing place is inside the entrance of the river.

Anchorage.—Natal roadstead is one of the worst on the coast, being much exposed to north-west and westerly winds.

The usual anchorage is in from 4 to 6 fathoms water over soft clay, with the fort bearing about East, distant 2½ miles.

Directions.—Vessels from the northward, bound to Natal road, should keep pulo Sikaladi bearing eastward of North until Gunong Karakara bears E. ¾ S., when Sirene reef will be passed, then steer about E.S.E. to bring tanjong Tuan, the south point of Telok Italang, in line with the west extreme of pulo Tamang, bearing S.S.E. ⅜ E., which leads

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directly up to Karang Bayam (Buoy, page 320), and when Bandeira hill bears E. $\frac{3}{4}$ S. it may be steered for, passing between Karang Pemuda and Karang Bayam towards the anchorage. Thence edge a little to the southward, and anchor as before mentioned. Plan, 2,760 [2,534]. Var. 0° 5′ E.

If tanjong Tuan and Telok Italang cannot be distinguished, with pulo Sikaladi bearing N. $\frac{1}{8}$ W. and Gunong Karakara E. $\frac{1}{2}$ S., a S E. $\frac{1}{8}$ E. course may be steered until Bandeira hill bears E. $\frac{3}{4}$ S.

Vessels from the southward may also bring tanjong Tuan in line with the west extreme of pulo Tamang, bearing S.S.E. $\frac{3}{8}$ E. and, using this as a stern mark, steer N.N.W. $\frac{3}{8}$ W., which will lead, in depths of $11\frac{1}{2}$ and 12 fathoms, westward of Karang Saket Bassi and Karang Kapal, and when ujong Rakit bears E. $\frac{1}{8}$ N. steer N. $\frac{1}{8}$ W. between Karang Bayam and Karang Kapal to the anchorage.

TELOK BRAMBANG is the bay, 8 miles in width, situated southward of Natal road, between ujong Brambang and pulo Tamang.

Batahan village lies in the south-east corner of the bay, on the north point of a small river, situated about 3 miles northward of ujong Palimbungang.

Dangers.—The 3-fathoms edge of the shoal water fringing Natal road, extends upwards of half a mile seaward of ujong Rakit and ujong Brambang, and then south-south-eastward into Brambang bay.

Karang Sigale, a small shoal with 2 fathoms water over it, lies S. by W. $\frac{1}{3}$ W., distant one mile from ujong Brambang. At one mile eastward of Karang Sigale is Durien shoal, which always breaks. Lat. 0° 29′ N. Long. 99° 4′ E.

Buoy.—A nun buoy, painted black and surmounted by a staff and ball, is moored in 7 fathoms water, on the west side of Karang Sigale.

Raja Inda, a small shoal with a depth of 3 fathoms over it, lies S. $\frac{1}{2}$ E., distant $2\frac{3}{4}$ miles from ujong Brambang.

Karang Tompe, a patch with 6 fathoms water over it, and from 7 to 9 fathoms around it, lies S. $\frac{1}{3}$ E., distant $2\frac{1}{2}$ miles from Karang Raja Inda. As less water may exist, it should be avoided.

Pulo Tamang, 148 feet above high water, is situated at the south-east extreme of Brambang bay, a mile from the coast, and the same distance northward of tanjong Palimbungang; it is surrounded by a reef, which in places extends $2\frac{1}{2}$ cables from the shore, with 6 fathoms close to. Lat. 0° 22′ N. Long. 99° $4\frac{1}{2}$′ E.

Karang Saoni, with 6 fathoms water over it, lies half a mile westward of the island.

Anchorage.—There is good anchorage in 10 or 11 fathoms water, over soft clay, between the island and the mainland, with the north point of the island bearing W.N.W. and ujong Palimbungang S. $\frac{1}{8}$ W.

General chart, 2,760 [2,534].

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Plan, 2,760 [2,534]. Var. 0° 5′ E.

Water.—A well of good water is situated on the island abreast the anchorage, and firewood may be obtained.

Directions.—Approaching from the northward, bring pulo Tamang to bear E.S.E. and steer for it, which will lead southward of Karang Laut; give the north point of the island a berth of about half a mile, and haul in for the anchorage on its eastern side, anchoring in about 10 fathoms water.

There is a safe passage between the island and the mainland, and small vessels coming from the southward, intending to enter Natal road by the inner passage, may pass in mid-channel between pulo Tamang and the mainland, in depths of from 6 to 10 fathoms. Thence by keeping in a depth of 9 fathoms, the shoals in Telok Brambang will be avoided; and when near ujong Brambang, by keeping in a depth of 5 to 6 fathoms, Shaftesbury shoal, which has a depth of 7 fathoms close-to, will be cleared.

Chart 2,760 [2,534].

COAST.—From pulo Tamang the coast, with a bight between, trends southward for 6 miles to tanjong Tuan, off which is pulo Robia, thence south-eastward for 3 miles to Biang hill 725 feet above high water.

Lat. 0° 13½′ N. Long. 99° 12½′ E.

Gunong Bargambar or Bagomba, 896 feet above high water, lies 4 miles eastward of Biang, thence the coast trends eastward to Ayer Bangies bay. Isolated shoals extend for a distance of 5 miles off many parts of this coast.

Plan, 2,760 [2,534].

AYER BANGIES ROAD is about 9 miles across in an east and west direction, between tanjong Bukit Barlayar and ujong Sawang Puding. It contains several islands and isolated shoals. Ayer Bangies village is situated on the eastern shore of the bay, off which the depth is about 3 fathoms at one mile distant. Southward of the village the water deepens.

Communication.—The Netherlands Royal Packet Company's steamers, running between Padang, Penang and Singapore, call monthly.

Supplies.—Poultry, cattle and good water can be obtained.

Dangers.—The following dangers lie to the westward of this part of the coast and in the approaches to Ayer Bangies road :—

Lat. 0° 19½′ N. Long. 98° 51½′ E.

Pylades reef, with a least depth of 4 fathoms over sand and rock, lies with Gunong Karakara bearing N.N.E. $\frac{7}{8}$ E., and Biang hill E. by S. $\frac{1}{2}$ S.

A coral reef, about 4 cables in extent, with 2½ fathoms water over it, lies 1½ miles, N.W. by W., from Pylades reef, with discoloured water, plainly seen, at one mile north-east of it.

Bayam reef, with a depth of 5½ fathoms over it, and 14 to 17 fathoms around, lies with the west extreme of pulo Tamang bearing

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N. by E. ¾ E., and tanjong Biang E. by S. ⅝ S. A patch with a depth of 6½ fathoms over it lies W. by N. ½ N., distant 2½ miles from Bayam reef. Chart, 2,760 [2,534]. Var. 0° 5′ E.

Two reefs half a mile from each other, in a north-east and south-west direction, with 2 fathoms water over them, which break and show discoloured water, are situated N.W. by W. ½ W., distant 2½ miles from tanjong Tuan.

Montrado reef, with 2½ fathoms least water over it, lies with the west extreme of pulo Tamang bearing N. ¼ W. and pulo Robia N.E. ¾ E., and has another reef situated one mile, S.W. by W. ¾ W., from it. Lat. 0° 14′ N. Long. 99° 4′ E.

Makasser reef, on which heavy breakers were seen, is reported to lie 5 miles south-westward of Montrado reef, with Biang hill bearing N.E. by E. ½ E., distant 10½ miles, and 3 miles southward of Makasser reef heavy breakers were also seen, but neither of these has been examined.

Tanjong Biang reef is situated 3½ miles southward of tanjong Tuan; and Tuan reef, on which there is a depth of 8 fathoms, lies 7 cables west-south-west of tanjong Biang reef. Lat. 0° 12′ N. Long. 99° 7′ E.

Buoy.—A nun buoy, painted white and surmounted by a staff and ball, is moored in 7 fathoms water, on the north-east side of tanjong Biang reef.

Labuang Lulu reef, 2 miles, S.E. by S., from tanjong Biang reef and S. by E. ⅜ E., distant 6 miles from tanjong Tuan, has a depth of less than 4 fathoms over it.

Macassar reef, with 2½ fathoms water over it, showing discoloured water and breaking, is about 4 cables in length in a north-east and south-west direction and lies W.S.W. distant 4 miles from pulo Pangka island. Vader reef is situated 3 miles, S.W. by W. ⅛ W., from the same island. Lat. 0° 6¾′ N. Long. 99° 12½′ E.

Islands in the approach.—Pulo Pangka, the south-western island off Ayer Bangies, has a small, sharp pointed hill on its south-west side, but is low to the southward. Pulo Talur, the south-eastern island, is covered with trees. Lat. 0° 8′ N. Long. 99° 16½′ E.

Pulo Pugago, about 2 miles north-north-westward of pulo Pangka, is oblong and covered with trees, and pulo Panjang, about 2 miles east-south-east of pulo Pugago, is a similar island but larger.

Kasi, a small island, is about one mile north-eastward of pulo Panjang.

Dangers southward of Ayer Bangies.—Van Speyk reef, with 2 fathoms least water over it, and 21 fathoms around, lies with the sharp pointed hill on pulo Pangka bearing N. by W. ⅔ W., distant about 10 miles; this reef sometimes breaks. Lat. 0° 1′ S. Long. 99° 19½′ E.

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Chart 2,760 [2,534]. Var. 0° 5′ E.

Moller reefs are two reefs, 1½ miles apart, in a N. by E. ½ E. and S. by W. ½ W. direction: the southern, about 3 cables in extent, has a least depth of 1½ fathoms over it and lies with pulo Pangka bearing N.N.W. ⅓ W. and Gunong Ophir E. by N. ⅔ N.

Lat. 0° 4½′ S. Long. 99° 23½′ E.

The northern reef, 5 cables in length in an east and west direction and 3 cables in breadth, has a least depth of 2½ fathoms, and is surrounded by depths of 23 fathoms.

Buoy.—A nun buoy, painted white and surmounted by a staff and ball, is moored, in 10 fathoms water, on the north side of the northern reef.

Gosong Satu, which always breaks, lies 7 miles off shore, surrounded by 15 fathoms water, with pulo Talur bearing N.W. ⅜ W. and Gunong Ophir E. ¾ N.

Gosong Dua consists of two reefs about 2 cables apart, which are always breaking; they are surrounded by depths of 11 fathoms, and from them pulo Talur bears N.W. by W. ⅓ W., distant 6½ miles.

Sikilang reef lies 2 miles north-eastward, and another reef, with 1½ fathoms water over it, lies 1½ miles north-north-westward of Gosong Dua, the latter with pulo Talur bearing W. by N. ⅔ N., distant 5 miles.

Lat. 0° 6′ N. Long. 99° 23½′ E.

Sikabu reefs are two reefs near each other, from which pulo Talur bears W.N.W., distant 2½ miles; the south-western has a depth of 2½ fathoms over it, and the other always breaks.

Two reefs lie about one mile northward of pulo Talur and always break; between them and the island there is a depth of 12 fathoms.

A reef lies 5 cables eastward of the south point of pulo Pangka, and always breaks.

A reef is situated 7 cables westward of the north point of pulo Pugago.

Water.—Good water may be obtained on pulo Panjang.

Landing is easily effected on the east side of pulo Panjang at high water.

Anchorage.—The anchorage in Ayer Bangies road is eastward of pulo Panjang, in 6 to 7 fathoms water, over soft clay; this anchorage is about 4 miles from the town.

Directions.—If intending to take the inshore route from pulo Tamang anchorage to Ayer Bangies, in passing between pulo Tamang and the coast keep rather on the island side, then in mid-channel between the island and ujong Palimbungan, and when the latter bears E. by N. steer towards tanjong Tuan to avoid the two reefs lying west-north-westward of that point.

The 7-fathoms line is near ujong Palimbungan and also tanjong Tuan, but between these points, and sometimes outside, the depths are

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less, and the shore, which in this space contains some bays, is safe to approach to 5½ or 6 fathoms. Chart 2,760 [2,534]. Var. 0° 5′ E.

When tanjong Tuan bears about East, steer to pass northward of tanjong Biang reef (Buoy, *see* page 323), and entering Ayer Bangies road northward of pulo Pugago and Panjang, pass between the latter island and pulo Kasi to the anchorage, as before directed. This passage seems undesirable for large vessels, but vessels of every description, by whatever channel they enter Ayer Bangies road, must keep a good look-out for shoals.

Vessels from the northward proceeding to Ayer Bangies road outside the shoals, or to the southward, should from abreast pulo Tamang, distant 7 or 8 miles, steer about S.S.E., passing about 2 miles westward of the 6-fathoms patch, west-north-westward of Bayam reef, and when tanjong Biang bears East alter course to S.E. by S., which should lead about midway between Montrado and Makasser reefs.

When Gunong Karakara is in line with the west point of Tamang island, bearing North, course may be altered more to the eastward to pass north or south of Macassar reef, lying 4 miles west-south-westward of pulo Pangka.

The sea breaks on some of the shoals off Ayer Bangies road when there is much swell, and between most of them there are safe channels, but the shoals are not always discernible when the sea is smooth. Pulo Pangka bearing East leads northward of Macassar reef, and between it and Labuan Lulu reef lying 5 miles to the north-westward; pulo Pangka bearing N.E. by N. leads south-eastward of Vader reef. Thence pass on either side of pulo Pangka to the anchorage, avoiding the shoals in the road, previously mentioned. The best channel is northward of pulo Pangka, where the depths are 10 to 11 fathoms, over soft bottom.

Sailing vessels proceeding southward from abreast pulo Pinie, bound to Padang or beyond, should pass westward of the Drake and Pylades reefs, keeping a careful look-out for the doubtful danger named Fatahul Mobarak. This route is to be preferable when the wind is fair, but is not so convenient in contrary winds as the passage eastward of these reefs, there being no anchorage. Both routes seem dangerous at night.

Tides.—It is high water, full and change, at Ayer Bangies, at about 6h. 30m.: springs rise about 3 feet.

COAST.—Sitchangang, a flat-topped hill, 1,166 feet above high water, is 3 miles southward of Ayer Bangies, and from it the coast has a south-east direction for 27 miles to tanjong Katiagan, where there is a rocky hill immediately over the coast. The village is on the north side of the mouth of the river, which has a shallow bar. Lat. 0° 10′ N. Long. 99° 24½′ E.

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Chart, 2,760 [2,534]. Lat. 0° 5′ N. Long. 99° 58′ E. Var. 0° 5′ E.

Gunong Ophir, about 20 miles north-eastward of tanjong Katiagan, and 9,558 feet above high water, appears like a cone, separated from the chain of other mountains, and is visible 110 miles in clear weather; it is the highest mountain on Sumatra visible from the sea. Singalang, a volcanic mountain, 37 miles to the south-eastward, is 9,439 feet above high water. (*Mountains continued from page* 312.)

Lat. 0° 24½′ S. Long. 100° 25½′ E.

Gunong Merapi, 9,488 feet above high water, lies about 7 miles eastward of Singalang.

Dangers.—Three reefs lie to the westward and north-westward of tanjong Katiagan, the outer about 11 miles from the shore, with Gunong Ophir N.E. by E. ¼ E. and Sitchangang N.N.W. ½ W.

Chart, 709 [2,538]. Lat. 0° 17½′ S. Long. 99° 48′ E.

Ujong Masang, situated about 10 miles south-south-eastward of tanjong Katiagan, is low, has a reef stretching out about half a mile, which should not be approached under a depth of 17 fathoms; Masang river runs into the sea near the point. Near the point are the three Masang hills; Masang the middle or largest, having a flat summit, and Antokan, the southernmost, and Labuan resembling haycocks. Between ujong Masang and the bluff south point of Ayer Bangies road, the coast is low, and forms Pasaman bay.

Dangers.—Southward of the shoals lying in the south-eastern approach to Ayer Bangies road, and westward of Pasaman bay and ujong Masang, are many outlying reefs, some of which occasionally break.

Chart, 2,760 [2,534]. Lat. 0° 17′ S. Long. 99° 7′ E.

Fatahul Mobarak reef, on which depths of from 4 to 9½ fathoms were reported, is about 2 cables in extent and does not break; it is stated to lie with Gunong Ophir bearing N.E. by E. ⅞ E. and tanjong Biang N. ⅛ E.

Lat. 0° 26′ S. Long. 99° 16½′ E.

Drakes reef is charted in two positions: the south-western is with Gunong Ophir bearing N.E. ⅝ E. and Gunong Singalang E. ¼ N.; the other position, which is doubtful, is 7 miles N.E. by N. of this.

Lat. 0° 21½′ S. Long. 99° 25′ E.

Pylades reef is also charted in two positions: the north-western, 22 miles from ujong Masang, with Gunong Ophir bearing N.E. ½ E.; the other position is about 7½ miles E.S.E. of this.

In both cases breakers were seen.

Dangers.—The following dangers lie between ujong Masang and Priaman:—

Chart, 709 [2,538]. Lat. 0° 32½′ S. Long. 99° 43¼′ E.

Montrado reef (Karung Sagi), which breaks, is situated S. by W. ⅝ W., distant 15 miles from ujong Masang.

A reef lies N.W. by W. ⅜ W., distant 8 miles from Montrado reef.

Haai or Dua reefs, about 4 miles to the north-eastward of the Montrado reef, are three-quarters of a mile apart and surrounded by deep

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water, there being 35 to 40 fathoms between them. On the northern reef the least water is $2\frac{1}{2}$ fathoms, and on the southern the same depth occurs on the north-west part, there being 5 to 6 fathoms on the south-east portion. Both reefs sometimes break. Chart, 709 [2,538]. Var. 0° 5′ E.

Ingaris reef, with 2 fathoms least water over it, and 28 to 30 around, lies S.S.W., distant 4 miles from pulo Ujong (Tiko islands). Lat. 0° 29¼′ S. Long. 99° 52′ E.

Bajam reef, with 8 fathoms water over it, and small in extent, lies $1\frac{1}{4}$ miles north-eastward from the above reef.

Gosong reefs lie near the coast; the larger, $1\frac{1}{2}$ miles in length and three-quarters of a mile in breadth, lies S.E. by E. $\frac{1}{8}$ E., distant 4 miles from pulo Ujong, and the smaller S.E. by E. $\frac{2}{3}$ E., $2\frac{1}{2}$ miles from the same island.

Buoy.—A nun buoy, painted black and surmounted by a staff and ball, is moored, in 7 fathoms water, on the north-west side of the southern reef.

Batik Besar reef, an extensive danger with 2 fathoms least water over it, lies N.W. by W. $\frac{5}{8}$ W., distant 8 miles from pulo Karsik; it often breaks, and can easily be made out by the discoloured water. Lat. 0° 31⅓′ S. Long. 99° 57′ E.

Karang Serunching and Batik Kechil lie about one mile to the south-westward of the foregoing reef, and half a mile from each other. The first is small in extent, hardly ever breaks, and has from 3 to $3\frac{1}{2}$ fathoms water over it; the latter, with a least depth of 2 fathoms, often breaks. They are surrounded by deep water.

Sungi Bamban reef, with $2\frac{1}{2}$ fathoms over it, lies N.W. by W., distant $6\frac{3}{4}$ miles from pulo Karsik; it often breaks.

Sungi Lima reef, on which are depths of 7 to 8 fathoms, lies N.W. by W. $\frac{3}{4}$ W., distant $5\frac{1}{4}$ miles from the same island.

Karang Durian, with a depth of 2 fathoms over it, is situated S.W. by W. $\frac{5}{8}$ W., distant about 4 miles from pulo Karsik; it seldom breaks or shows discoloured water.

Selita reef, with from 5 to 6 fathoms water over it, and surrounded by depths of from 50 to 80 fathoms, lies W. $\frac{1}{8}$ N., distant 14 miles from pulo Karsik.

Discoloured water was seen $5\frac{1}{2}$ miles S.W. of Selita reef.

Lawe reef, with 8 fathoms water over it and surrounded by depths of more than 80 fathoms, lies W. $\frac{7}{8}$ S., distant 12 miles from pulo Karsik. Lat. 0° 38′ S. Long. 99° 52′ E.

Great caution is requisite when navigating in this locality, which is one of the most dangerous parts of the coast, being but imperfectly known.

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Plan, 2,760 [2,534]. Lat. 0° 25½′ S. Long. 99° 52½′ E. Var. 0° 5′ E.

TIKO ISLANDS, distant 9 miles south-eastward of ujong Masang, are three in number, extending in a south-west direction from Tiko and named respectively, from the northward, pulo Karsik, pulo Tenga and pulo Ujong; the latter, having a large, round tree on it, is about 1½ miles from tanjong Tapi.

Pulo Tenga is low, and covered with cocoa-nut palms.

Dangers.—Gombo reef, with 8 fathoms water over it, lies S.W. by S., distant 5 cables from pulo Ujong, and north-eastward of that island is a reef which dries at low water, spring tides, and always breaks. A shoal, with one fathom water over it, lies about 2 cables northward of pulo Tenga.

Between pulo Tenga and pulo Ujong there is a channel, with depths of from 10 to 11 fathoms on either side of the drying reef.

Anchorage.—Vessels sometimes run under these islands for shelter during N.W. winds. The best anchorage is in from 7 to 8 fathoms water, eastward of pulo Tenga, with the south point of that island bearing W. ¾ N., and the west side of tanjong Tapi N. ¼ E. Small vessels may anchor, in 3 to 4 fathoms water, eastward of the reef, which extends about a quarter of a mile southward of tanjong Tapi; this reef always breaks.

Directions.—Pulo Ujong should be approached bearing about East, or southward of that bearing. Pass within one mile off its west and south sides, where there are depths of from 15 to 17 fathoms, to avoid the numerous shoals lying from 3 to 15 miles south and south-westward of it, over some of which the swell may be seen to roll if there be any sea. Thence north-eastward to the anchorage.

Chart, 2,760 [2,534].

Ayer Bangies to Tiko anchorage.—From about a mile eastward of pulo Pangka steer about S.E. by S., and when Sichangang bears North, the vessel should be about midway between Satu and Van Speijk reefs. Leave Moller reefs (Buoy, page 324) on the starboard hand and pass about 3 miles westward of the outermost danger, situated 11 miles from tanjong Katiagan. When tanjong Katiagan bears East, steer about S.E. ½ E., till Antokan bears N.E. by N., when course may be altered to East for pulo Ujong.

Plan 2,760 [2,534]. Lat. 0° 38′ S. Long. 100° 6′ E.

PRIAMAN ISLANDS, three in number, and named respectively, from the northward, pulo Anso, pulo Tenga and pulo Ujong, are low and wooded. They lie in a north-north-west and south-south-east direction abreast of the settlement of the same name on the Sumatra coast, about 1½ miles distant, and afford shelter from N.W. and westerly winds; pulo Anso, the northernmost, has a well of fresh water.

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Pulo Karsik lies about 3 miles north-westward of Priaman, and half that distance off shore; it is small, covered with trees, with a sandy beach, and encircled by a reef to the distance of from one cable to 2 cables. Chart, 2,760 [2,534]. Lat. 0° 36′ S. Long. 100° 44′ E. Var. 0° 5′ E.

Pulo Anso, the northernmost of the Priaman islands, is surrounded by a reef which extends about 1½ cables from its south-west side; it lies about one mile west-south-westward of Priaman.

Pulo Tenga, or middle islet, is distant about three-quarters of a mile from pulo Anso, with 3½ to 6 fathoms water in the channel between; a reef extends from its western side.

Pulo Ujong, the southern islet, is surrounded by a reef and distant three-quarters of a mile from pulo Tenga; each of these islands is about one cable in diameter.

Dangers in the approach.—Karang Durian. *See* page 327.

Kayuputi reef, S.W. ⅛ W. distant 2 2/10 miles from pulo Karsik, has 2½ fathoms least water over it, and often breaks.

Three reefs lie within a mile north-eastward of Kayuputi reef; Kandupulu reef, is the northern, Sipakal reef, the western; Kenali reef, the eastern, has 1½ fathoms least water over it.

Karang Sepulu has 4½ fathoms water over it and is surrounded by depths of 9 fathoms; it lies 5 cables, N.W. by W. ⅛ W., of pulo Anso.

Close to the shore near the mouth of Priaman river are two reefs always showing, and about half a mile north-west and south-east of these there is a reef which dries at low water and sometimes breaks.

Gosong Sibarat, which dries at low water, lies 3 cables south-west of pulo Ujong with a passage between in which there are depths of from 13 to 14 fathoms.

Priaman.—The town or village of Priaman is situated on the south point of a small river, the entrance to which is so shallow that a boat cannot enter until near high water.

Communication.—The Netherlands Royal Packet Company's steamers running between Padang, Penang and Singapore, call once a month.

Landing.—The best landing place is on the sandy beach south of the river mouth.

Landmarks.—North-westward of Priaman are two hills: mount Tiga, 1,624 feet above high water, the northern, about 9 miles from the coast, when seen from the westward, is somewhat conical in shape and having three tops, the southern being the lowest. *See* View Chart 709. Chart, 709 [2,538]. Lat. 0° 29½′ S. Long. 100° 13½′ E.

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Chart,709 [2,538]. Lat. 0° 34½′ S. Long. 100° 14′ E. Var. 0° 5′ E.

Mount Sulasi, the southern hill, is 650 feet above high water, situated 7 miles from the coast, and also conical shaped when seen from the westward.

Directions. — From Tiko anchorage bring pulo Ujong to bear N.W. and steer S.E., passing Gosong reefs (Buoy, page 327) on the port, and Sungi Bamban on the starboard, hand, and when pulo Karsik bears East, distant about half a mile, steer about S. by E. ½ E. to clear Karang Sepula, and thence between pulo Anso and pulo Tenga.

Or bringing pulo Ujong to bear N. ¼ W., steer S. ¼ E. for 9 miles, leaving Ingaris about 1½ miles on the starboard, and Batik Kechil about the same distance on the port hand, and when pulo Karsik bears E. ¼ S., it may be steered for.

Vessels not entering Priaman road and bound to Padang or south-eastward, being about 1½ miles south-westward of Gosong Sibarat, may steer S.E. ½ S. which should lead about a mile north-eastward of pulo Air; of the shoal south-eastward of it and of Karang Sipakal, there being no known danger inshore of this except the reef, lying rather more than a mile west-south-westward of pulo Sau.

There is a channel on either side of pulo Sau, but that to the westward is the best and most direct, care being taken to avoid the shoal already mentioned. When southward of that islet a direct course may be steered for Padang head, or should unfavourable weather be apprehended, for the anchorage under pulo Pisang, where vessels are sheltered from N.W. and westerly winds; or for Emma haven within pulo Pisang, where there is complete shelter.

PADANG.—Islands and dangers in the northern approach. — Padang islands, seven in number, interspersed with numerous reefs, lie from 7 to 13 miles off Padang and the coast northward of it; they are all low and wooded.

Lat. 0° 45¼ S. Long. 99° 59½′ E.

Pulo Bando, the northernmost islet, is small and encircled by a reef which is "steep-to"; it lies 10¼ miles south-west of Priaman.

Bajam reef, lying N.W. ½ N., distant 4 miles from pulo Bando, has 2½ fathoms water over it.

Pulo Pie lies 9 miles, S.E. ⅝ S., of pulo Bando, and between are a number of shoals.

Dangers between pulo Bando and pulo Pie.—Two reefs with from 3 to 4 fathoms water over them, and surrounded by depths of 25 fathoms, lie S. by E. ⅝ E. and S.S.E. ⅓ E., distant 2 and 2½ miles respectively from pulo Bando.

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Also, S.E. by S., at about 4 and 4½ miles from the same island, are two reefs with 4 and 5 fathoms over them; and N. by W. ½ W. and N.W. ½ N., at distances of 2½ and 1 2/10 miles from pulo Pie, are situated two more reefs, having 2½ fathoms least water over them. Both of these last reefs sometimes break. Chart, 709 [2,538]. Var. 0° 5′ E.

All these shoals are surrounded by deep water.

Stort reef, about 5 cables in length in a N. by E. and S. by W. direction, has a least depth of 3½ fathoms over it and lies with pulo Bando bearing North, distant 8¾ miles; the south-eastern side of the reef is "steep-to," and it generally shows by discoloured water. Lat. 0° 54½′ S. Long. 99° 59½′ E.

Pulo Air or Lima is situated East, distant 6¼ miles from pulo Pie.

Dangers.—On a small reef situated W. by N., distant 3 miles, from this island there is a least depth of 2 fathoms; it is surrounded by depths of from 45 to 50 fathoms and often breaks.

A reef lying 7 cables south-eastward of the same island has depths of from 3 feet to 4 feet over it, surrounded by depths of 36 fathoms.

Pulo Pandang lies S.S.E. ½ E., distant 5 miles from pulo Pie. Lat. 0° 57′ S. Long. 100° 8′ E.
(*See* Light, page 333.)

Between pulo Pie and pulo Pandang there is an extensive reef with 2½ fathoms least water over it, which sometimes breaks; it is situated N.W. by N., distant 2¼ miles from pulo Pandang.

Pulo Sibuntar (Satu), the easternmost of the group, is small, high, flat, and distant 5 miles eastward of pulo Pandang; its north-east and east sides are foul to half a mile distant.

About half a mile north-eastward of the island there is a small reef with 3 fathoms water over it, and about the same distance, eastward of the island, a sandbank.

Karang Sipakal has a depth over it of one fathom with 32 to 36 fathoms around, and seldom breaks; it lies with pulo Sibuntar in line with pulo Bindalang, bearing S.W. ⅔ S.

Pulo Bindalang (Dua) lies 2 miles south-west of Sibuntar, having a safe passage between them.

A reef, with one fathom water over it, which sometimes breaks, is situated S.E. ⅝ E., distant 2½ miles from pulo Bindalang.

Pulo Toran, the southern and largest of the Padang group, lies S.W. by S., distant 3¾ miles from pulo Bindalang. Lat. 1° 2¼′ S. Long. 100° 10′ E.

Dorothea reef, 7 cables in length in a north-north-west and south-south-east direction, has 4 to 6 fathoms over the north-west, and 2½ fathoms least water over the south-east, part; it lies with pulo Toran bearing S. by E. ⅞ E. distant 1 7/10 miles.

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Chart, 709 [2,538]. Var. 0° 5′ E.

A reef, with 1½ fathoms water over it, lies E. by N. ⅛ N., distant 2½ miles from pulo Toran.

Bellona shoal, with a depth of less than 5 fathoms, lies S.E. by S., distant 3 miles from pulo Toran. Between pulo Toran and Bellona shoal there is a rock above water, about 2 miles S.E. ½ E. from the island.

Lat. 0° 51½′ S. Long. 100° 18′ E.

Pulo Sau, not one of the seven Padang islands already described, is a small islet 7 miles, N.N.W. ⅛ W., of Apenberg head and 1½ miles off shore, it is surrounded by a reef which projects about a quarter of a mile from its south end.

Reef.—A reef, with 1½ fathoms water over it, and which breaks, lies S.W. by W. ⅜ W., distant 1 2/10 miles from pulo Sau.

Lat. 1° 16′ S. Long. 100° 17¾′ E.

Southern approach.—Pulo Niamuk (Muskito), situated about 18 miles southward of Apenberg head, and 6½ miles from ujong Teluk Lambu, is the outer island, in the approach to Padang from the southward. It is a low, sandy island covered with cocoa-nut palms and with reefs extending to the distance of about half a mile from the north and south sides of it.

Pulo Laut lies 10 miles, N.W. ⅛ W., from pulo Niamuk. It was formerly a breaking reef, but trees have since grown up.

A reef, with 7 fathoms water over it, lies with pulo Laut bearing W. by N., distant 3½ miles.

Pulo Marak, 4 miles north-eastward of pulo Niamuk, and 1¼ miles off shore, is 1¼ miles in extent, inhabited, and affords good water; near the south point is pulo Sibuntar, a large rock covered with trees.

Condor reef, on which the depth is 4½ fathoms, is about 1¼ cables in length in a north-north-west and south-south-east direction, and half a cable in width; it lies with pulo Niamuk bearing S.S.E. ⅛ E., distant 3¼ miles.

Iskander shoal, with 4 fathoms water over it, lies with pulo Niamuk bearing S. by E. ⅛ E., distant 4⅓ miles.

Anchorage.—Pulo Karang Ango, pulo Pagang, pulo Bintangor, pulo Sirongong, pulo Sikowai, and pulo Siranda are small islets lying northward of pulo Marak. There is anchorage in from 10 to 20 fathoms on the east side of all these islets, and shelter from N.W. and West winds.

Dolphin and Serinda shoals.—Dolphin shoal lies nearly 3 miles, N.W. by W. ⅛ W., from pulo Marak. Karang Serinda, which breaks, is situated W. ¾ N., distant 2 miles from pulo Bintangor, with deep water between.

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Pulo Siranda (Seronda) is low, sandy and grown over with cocoa-nut palms; pulo Sinjaru (Senaro), lying $3\frac{3}{4}$ miles north-west from it, is covered with boulders. Chart, 709 [2,538] Lat. 1° 7½′ S. Long. 100° 20¼′ E. Var. 0° 5′ E.

A rock, above water, and surrounded by depths of 36 to 40 fathoms, is situated N.W. by W. $\frac{1}{4}$ W., distant $2\frac{1}{2}$ miles from pulo Sinjaru.

Gusong Siranda is a reef lying S.E. $\frac{2}{3}$ E, distant $1\frac{1}{2}$ miles from pulo Sinjaru.

A bank with a depth of $6\frac{1}{2}$ fathoms over it, at low water, spring tides, is situated E. by S. $\frac{1}{2}$ S. distant $2\frac{2}{3}$ miles from pulo Sinjaru.

Regentes reef, on which there is a depth of 6 feet, lies N.E. $\frac{1}{4}$ E., distant $1\frac{1}{4}$ miles from pulo Sinjaru, and N.E. by E. $\frac{2}{3}$ E., distant $2\frac{1}{10}$ miles from the same island there is a reef, with $2\frac{1}{4}$ fathoms water over it.

The above are the principal dangers in the southern approach to Padang, but it is necessary to keep a careful look-out aloft when in the vicinity of any of these reefs, as others may exist.

PADANG is the chief settlement of the Dutch on the west coast of Sumatra. Its principal portion, with a fort, is situated on the north bank of the river, one mile within Apenberg head. Small craft can discharge at the railway wharf in the river. Plan, 212 [2,539].

In 1900 the population consisted of 1,234 Europeans, 28,342 natives, 7,914 Chinese, and 1,421 other nationalities.

The port of Padang is now Emma haven in Koninginne bay, nearly 3 miles to the southward of Padang (page 336).

LIGHTS.—Pulo Pandang.—An iron tower, 190 feet in height, with a dwelling, the whole painted white, exhibits, at an elevation of 180 feet above high water, a *white flashing* light with a period of system of fifteen seconds, showing *flash* for *three seconds* followed by an eclipse of *twelve seconds* duration; it should be visible, in clear weather, from a distance of 19 miles, except when obscured by islands. Lat. 0° 57′ S. Long. 100° 8′ E.

Pulo Pisang.—On the south-west point of pulo Pisang a *white occulating* light with a period of system of *twelve seconds*; showing light, *six seconds*, eclipse, *six seconds*, is exhibited, at an elevation of 105 feet above high water, from an iron support on a stone dwelling, 39 feet in height and painted white; and should be visible, in clear weather, from a distance of 12 miles, between the bearings of S. 7° E. through east and north to S. 85° W. except where obscured by some islands. Lat. 0° 59¾′ S. Long. 100° 20′ E.

Apenberg.—A *red fixed* light is exhibited at an elevation of 16 feet above high water, from an iron davit on a stone dwelling, painted white and situated on the north point of Apenberg; it should be visible, in clear weather, from a distance of 4 miles, between the bearings of N. 78° E., through south, to S. 45° W. Lat. 0° 58′ S. Long. 100° 20¼′ E.

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Chart,212 [2,539]. Var. 0° 5′ E.

Communication.—The Netherlands Royal Packet Company's steamers from Batavia call fortnightly and also those from Singapore, touching the coast at other ports. There is a regular service of steamers to Rotterdam.

A railway connects the port with Padang, and port Emma and Padang with the coal fields on the Ombilien river. There is a cog-wheel railway to Paja-Kombo.

Padang is connected with other ports of Sumatra and with Batavia by telegraph. (*See* Chapter I., page 21.)

Coal and supplies.—Coal may be obtained. For coaling facilities, *see* Emma haven.

Provisions, bullocks, poultry, fruit, vegetables, and fresh water are abundant. In Emma haven vessels can water from the pipes laid on to the wharves. There are no facilities for the repairs of vessels either at Padang or Emma haven.

Tugs.—There are two tugs available.

Trade.—Padang is an open port. The principal exports are coffee, pepper, india-rubber, coal, gold dust, copra, benzoin, nutmegs, mace, and cinnamon; and the imports are tobacco, petroleum, rice, linen, liquors, provisions, opium, cloth, and other dry goods; in 1901 the imports amounted in value to about £600,000 and exports to about £450,000, and, in 1902, 91 vessels entered the port, of which 88 were steamers.

Padang river (Batang Arau) is only navigable by craft under 6 feet draught in fine weather, the depths at low water being 9 feet at the entrance, 7 feet off the Custom house, decreasing above; the rise of tide is about 3 feet at springs. When the wind blows strong from West or N.W., the sea breaks entirely across the entrance and for some distance seaward.

Lat. 0° 58′ S. Long. 100° 20¾′ E.

Apenberg head, the south point of entrance to Padang river, is a high bluff headland, 355 feet above high water, thickly wooded and having a flagstaff on its summit. Whale rock lies close westward of the head. In approaching from the offing, Apenberg head will easily be known by its bluff aspect, and the coast southward of it being bold high land; whereas the land near the sea to the northward of the river is low, and all the coast is low thence to Priaman, but far back from the coast the land is generally high.

The bank, with less than 3 fathoms water over it, fronting the shore between Apenberg head and Jungut Batu Patè point, the west extreme of Koninginne bay, extends about half a mile off these points, one mile from the shore of the bays between them, and to within about 2 cables of pulo Pisang.

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Pulo Pisang, about 1½ miles southward from Apenberg head, is 4 cables in length in a north and south direction and 3 cables in breadth, with two landing piers on its eastern side. A coral bank encircles the island to the distance of three-quarters of a cable in places, "steep-to," a short distance beyond. (Light, *see* page 333.) Chart, 212 [2,539]. Var. 0° 5′ E.

Beacon.—A white stone pillar and the light support are situated on the hill at its south-west end.

Padang road.—Anchorage.—The best and most sheltered anchorage is about one cable eastward of pulo Pisang, known as Padang road, in depths of from 5 to 6 fathoms, over soft blue clay, with the extremes of the island bearing about S.W. by W. and N.W. by W.; these depths extend over a breadth of about one cable.

Directions.—Mount Talang, 8,520 feet above high water, situated about 18 miles within Apenberg head: Padang hill, 1,056 feet, on which there is a signal staff, near Apenberg, and mount Pangilun, northward of it, are conspicuous objects when approaching Padang in clear weather, and the islets mentioned in the approaches should be all easily identified. Charts, 709 [2,538]; 212 [2,539]. Lat. 0° 58¾′ S. Long. 100° 21½′ E.

Vessels from the northward should make pulo Bando bearing about E. by S. ½ S. and steer for it on that bearing, passing on either side at about half a mile distance; and continue this course until about 5 miles eastward of pulo Bando, whence steer for Padang road, the anchorage under pulo Pisang, passing between pulo Air and pulo Sau.

Entering Padang road from the westward, which appears to be the best route, approach Padang lighthouse bearing East, to avoid Stort reef, thence passing close southward of pulo Pandang, steer E. by S. between pulo Sibuntar and pulo Bindalang to the anchorage under pulo Pisang; or proceed for Emma haven, where there is secure anchorage.

The south channel is preferable in proceeding to the anchorage under pulo Pisang, passing south of that island at about a quarter of a mile distant, and then steering for a berth off the south pier, where there is shelter from West and N.W. winds.

Steam vessels from the southward may take the passage on either side of pulo Niamuk, recommended for sailing vessels; or on either side of pulo Laut, or of pulo Toran, thence as will be seen on the chart.

A sailing vessel may naturally take either of the routes for steam vessels which will give her a leading wind.

Approaching Padang from the southward, with a favourable wind, a sailing vessel should make pulo Niamuk, a low islet with trees from 30 to 50 feet high. The island should not be brought to bear westward of N. by W. ½ W., nor approached within one mile, as reefs extend about

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Chart,709 [2,538]. Var. 0° 5′ E.

5 cables from it. Having passed pulo Niamuk at about one mile distant, on either side, course should be shaped to pass the same distance west of pulo Marak, and at about half a mile westward of pulo Bintangor and pulo Siranda to avoid Dolphin and Serinda shoals. There is also a narrow and safe passage eastward of pulo Bintangor and pulo Siranda with depths of 20 to 30 fathoms, and which is generally considered the best.

Having passed pulo Siranda by either channel, it should then be brought to bear S. ¼ W., steering N. ¼ E. for pulo Pisang lighthouse, which course will lead eastward of a 6-fathoms patch and another of 2¼ fathoms lying 2 miles east-north-eastward of pulo Sinjaru and westward of Marlboro' shoal to Padang road, the anchorage within pulo Pisang. If bound to Emma haven, the course is eastward of Marlboro' shoal buoy.

Tides.—In Emma haven there is a self-registering tide gauge. It is high water, full and change, at 6h. 50m.; springs rise 3½ feet; neaps 2¼ feet; neaps range 1 foot.

Tidal streams.—In Padang road the flood sets to the north-west and ebb to the south-east at a rate of not more than one knot an hour.

Climate.—Padang is generally considered healthy. There are no regular wet and dry seasons; rain most frequently falls during the night, but sometimes it rains for two or three days in succession. (*See* also pages 23, 29, 33.)

Chart,212 [2,539].

KONINGINNE BAY.—Emma Haven (native name Telòk Bajur).—In Koninginne bay, situated about 3 miles southward of Padang, a breakwater, half a mile in length in a south east direction, extends from the western shore, enclosing a space about half a mile square, with a depth of about 4½ fathoms, forming Emma haven.

On Karsik shoal, which occupies the centre of the harbour, a breakwater, 300 yards in length, built parallel to, and distant about 500 yards from, the main wharves, shelters the space within from all winds; but that portion of the bay eastward of the breakwater is open to south-west winds.

Lat. 1° 2½′ S.
Long. 100° 22½′ E.

LIGHTS.—On ujung Sungi Bramei or Batu Mandi, on the east side of entrance to Koninginne bay, an iron framework 47 feet in height and painted white, exhibits, at an elevation of 548 feet above high water, a *white flashing* light with a period of system of *five seconds*, which should be visible from a distance of 30 miles in clear weather, but is obscured by

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the land between certain bearings, and visible in Emma haven and Bunga bay. There is a signal flagstaff near it. Chart, 212 [2,539]. Var. 0° 5′ E.

A *red fixed* light is shown from an iron davit, painted white on the pier head at an elevation of 19 feet above high water, which, in clear weather, should be visible from a distance of 4 miles between the bearings of North and N. 84° E.

Rock.—A rock, with 3½ fathoms water over it is situated N.W. by N., distant 50 yards from the pier head light structure.

Coal.—Wharf accommodation.—Vessels are coaled at the buoys by lighters, which hold from 100 to 140 tons. There are warehouses and three wharves, each about 280 feet in length, one of 180 feet in length, and a shorter one where the colliers load; there is a low-water depth of 26 feet alongside and the railway trucks run on to the wharves. The railway is connected to the Ombilien coal fields in the interior, and with Padang: these mines belong to the Crown.

Two steam cranes have a lifting power of from 3 to 4 tons, and hydraulic cranes are also available for loading and discharging cargo. Vessels cannot lie alongside each other, as there is generally too much swell; there are several mooring buoys. Vessels with petroleum are not permitted to enter the harbour, and have to discharge at pulo Pisang.

Communication, supplies, &c.—*See* Padang, page 334.

Water is laid on to the wharves and supplied free of charge to vessels of war from two hydrants, at the rate of 12 tons per hour for each hydrant.

Marlboro' shoal, which has about 4 feet water over it and usually breaks, is about a cable in diameter and the outer and south-westernmost danger in the approach to Emma haven; it lies with Sungi Bramei point bearing E. ⅞ S., distant 1½ miles.

LIGHT BUOY.—A light buoy, painted black, is moored on the south side of Marlboro' shoal, and exhibits a *white occulting* light with a period of system of *thirty seconds*, showing light for *twenty seconds*, followed by an eclipse of *ten seconds*.

Pasir Gadang on the west side of the approach, between Marlboro' shoal and Jungut Batu Pati point, is a shoal nearly 3 cables in length, in a north and south direction, and 2 cables in width, which dries at low water; near its eastern side is a sand islet about 200 yards in length. Patches of one fathom and 1¼ fathoms lie between Pasir Gadang and Marlboro' shoal. Lat. 1° 1½′ S. Long. 100° 21½′ E

Beacon.—An iron beacon, painted black and surmounted by a ball, is erected on Pasir Gadang, with Jungut Batu Pati point bearing N. ⅝ E. distant about 8 cables.

Buoys.—On the eastern side of the channel a patch, with 4 fathoms water over it, is marked by a nun buoy, painted white, from which Pasir Gadang beacon bears W. ½ N. distant nearly 1 1/10 miles.

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Chart, 212 [2,539]. Var. 0° 5′ E.

Off the extremity of the breakwater, there is a can buoy painted black.

LIGHT BUOYS.—A buoy, painted white, moored off the south-west end of the breakwater on Karsik shoal, shows a *green fixed* light.

A buoy, painted black, moored off the north-east end of the breakwater on Karsik shoal, shows a *red fixed* light.

Two buoys, painted white, and moored E. by N. ¾ N. and N. by E. ¾ E., distant 4 and 4½ cables respectively, from the breakwater light, each exhibit a *green fixed* light.

Pilots.—Pilots are stationed at Emma haven, and by day the pilot boats fly a blue flag, with letter E in white on it, and at night show a red lantern light.

Native licensed pilots for the west coast of Sumatra are obtainable at Padang and Emma haven.

Directions.—The directions for Padang road from the southward, page 335, apply also to Emma haven.

From abreast and eastward of Marlboro' shoal buoy, course must be shaped to pass between the black buoys on the port hand and the white buoys on the starboard hand, to Emma haven. The turning around Karsik shoal is somewhat sharp for long vessels, and requires care. With local knowledge the port may be entered at night.

By night.—Having made pulo Pandang light, steer for it bearing East, or on such a bearing as to clear the outlying shoals, and, passing about half a mile southward of it, steer E. by S. to pass southward of pulo Pisang light. When the latter bears North, steer South to pass westward of Malboro' shoal, and with ujong Sungi Bramei light, bearing about E. ½ N., steer for it, which should lead about 4 cables southward of Malboro' shoal (Light buoy, *see* page 337), and when Emma haven breakwater light bears about N. by E. ½ E., it should be steered for, passing about a cable westward of it to the harbour, avoiding the rock northwestward of the lighthouse.

A vessel desirous of entering Emma haven after sunset must report this by signal to the lighthouse keeper on ujong Sungi Bramei, who will telegraph to the harbour master, and as soon as a satisfactory answer is received, he sends up a rocket as a signal that the pilot will come off and bring the vessel in.

Chart, 709 [2,538].

COAST.—From Padang to the distance of 30 miles southward the coast is intersected by numerous bays and inlets, several of which, being protected from the sea by the islands contiguous to them, form excellent harbours. The land near the sea is generally of moderate height and, farther in the country, more elevated. Mount Talang 8,520 feet above high water, is before referred to.

Lat. 0° 58¾′ S. Long. 100° 40½′ E.

General chart, 2,760 [2,534].

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BUNGA BAY, in which there are several villages, is separated from Koninginne bay by ujong Sungi Bramei. It is a safe anchorage, with from 14 to 15 fathoms water in the entrance, and from 7 to 10 fathoms farther in. Pulo Kassie, a small islet, lies near the middle of the northern arm of the bay, with a shoal about 2 cables N. by E. of it, and another about 6 cables South. Plan, 866 [2,541]. Var. 0° 5′ E. Lat. 1° 2½′ S. Long. 100° 23½′ E.

The directions for approaching Padang from the southward (page 335) apply here also. When in the entrance, borrow towards the northern side to avoid the shoals off pulo Kassie, and anchor between it and the island, or nearer to the head, where there is good shelter. Shallow water extends off the point and island that form the north-east side of this anchorage, and there is the shoal nearly in the middle of the entrance, lying about 7 cables southward of pulo Kassie. There are several villages in Bunga bay.

Anchorage.—The anchorage on the northern side of the bay is in 8 fathoms water, over mud, with pulo Karsik bearing W. by S. ⅔ S., and the island, near the shore off Gunung Gunung point, S. by E. ¼ E. At the south-east angle of the bay there is anchorage in from 10 to 12 fathoms water, a little open to westerly winds.

Sungi Pisang bay, lying close southward of Bunga bay, is about one mile across, and open to westerly winds. Two rocks lie in the entrance, with depths of 1¼ and 2 fathoms over them; abreast the rocks, close to the northern shore, there is a narrow passage with 15 to 17 fathoms water decreasing inside to 8 and 9 fathoms; there is also a narrow passage between pulo Sikowai off its entrance, and the southern point of the bay. Chart, 709 [2,538].

Sungi Pinang bay lies southward of Sungi Pisang bay, and is free from outlying dangers. In this bay vessels are sheltered from almost every wind by pulo Marak, and it is only open to S.S.W.; the depths are from 25 to 30 fathoms in the fairway, decreasing to 11 and 6 fathoms at its head.

Tarusan bay, fronted by pulo Chubadak, is about 5 miles in extent, and safe, with general depths of from 8 to 16 fathoms, over soft blue clay. Tarusan village, lying in the south-east part of the bay, is a place with considerable trade. There are two passages into the bay, on either side of pulo Chubadak. Plan, 1,701 [2,533]. Lat. 1° 13′ S. Long. 100° 25′ E.

In entering by the northern channel, which is about one-third of a mile wide, the northern shore must be kept, to avoid a reef with 2 fathoms water over it, lying about 3 cables west from the north-west point of pulo Chubadak. The north-east point of pulo Chubadak open of the north-west point, bearing about East, leads northward of this shoal. Within the entrance the channel is safe.

General chart, 2,760 [2,534].

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Plan, 1,701 [2,533]. Var. 0° 5′ E.

In the entrance, southward of pulo Chubadak, there are three islands, of which pulo Seronjong Gedang, the largest, lies in the middle; pulo Nibung and pulo Seronjong Kachik, the others, are on the north side, connected to pulo Chubadak by reefs. There is a channel about 1½ cables wide between pulo Seronjong Gedang and the northern islets, with depths of from 10 to 20 fathoms.

Pulo Setan Kechil, in the middle of Tarusan bay, is 177 feet above high water and surrounded by shallow water and dry rocks, and a line of shoals extends north-eastward from it to the head of the bay. Upon the main, abreast and close to the shore, there is a watering-place.

Chart, 709 [2,538].

DANGERS.—Ujong Telok Lambu is about 2½ miles southward of the entrance to Tarusan bay, and between it and ujong Raja, 24 miles further south, there are the following islets and dangers:—

Lat. 1° 23½′ S. Long. 100° 29′ E.

Pulo Aur Gedang (Ayer Besar), the largest of the islets, about a mile in length in a north-north-west and south-south-east direction, lies about 8½ miles south-south-eastward of ujong Teluk Lambu, and has a conspicuous round hill, 443 feet above high water, on its south side; close to the southward of it is pulo Aur Kachik (Ayer Kechil), connected by a reef, on which lie some small islets, with the larger island. Both are inhabited.

Pulo Kumbang and pulo Babi lie nearly midway between these islands and the mainland to the northward, and pulo Sermangki, a group of rocks, lies between them and Chingkuk bay.

Lat. 1° 30′ S. Long. 100° 26′ E.

Panyu, the outer islet, lies 6 miles south-westward of Aur Kachik, and 8 miles off shore. All these islands have deep water within a short distance.

Supplies.—Poultry and water may be procured at pulo Babi.

Gebua Namaja, with 1¾ fathoms water over it, and which sometimes breaks, lies with the round hill on pulo Aur Gedang bearing E. ⅞ S., distant 5 miles.

Gebua Dingin, about 2½ miles, N.W. by W. ¼ W., from Gebua Namaja, has a depth of 3 fathoms over it and lies with the hill on pulo Aur Gedang, bearing E. by S. ½ S.

Erasmus reef, formed of coral and with 3 fathoms water over it, lies with pulo Panyu, bearing S.S.E. ⅓ E., distant 2 miles.

Van Speik reef, about 2 cables in length in a north-west and south-east direction and one cable in breadth, is formed of coral, has 2 fathoms water over it, and lies E.N.E., distant 2½ miles, from pulo Panyu.

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These reefs being "steep-to" should be given a wide berth, vessels passing well to westward of a line joining pulo Niamuk and pulo Panyu. Chart 709 [2,538]. Var. 0° 5′ E.

CHINGKUK (TYINGKOK) BAY lies about 11 miles south-eastward of ujong Teluk Lambu, and is the northernmost of four bays in the extensive bight formed between ujong Baton and ujong Telok Kersik.

Anchorage.—The bay has regular depths and good anchorage near Salido village, in from 4 to 6 fathoms water, at its north-west part. Lat. 1° 20′ S. Long. 100° 34′ E.

Directions.—Approaching Chingkuk bay from the northward, vessels may pass on either side of pulo Niamuk, thence steering for pulo Kumbang to avoid the shoals south-eastward of pulo Niamuk. Between pulo Kumbang and pulo Aur Gedang the depths are from 16 to 25 fathoms, and from between these islands, steer to pass southward of the Sermangki group.

Painan bay lies eastward of pulo Chingkuk, with depths of from 7 to 10 fathoms in the channel southward of the island, and from 4 to 7 fathoms in the bay. Painan is a place of considerable trade, and has a wharf for the convenience of landing and unlanding goods.

Anchorage may be obtained, about half a mile southward of Chingkuk island, in from 10 to 12 fathoms water, or nearer the shore in 6 fathoms with Painan village bearing N.E. $\frac{1}{4}$ E.

Batung (Batuwang) bay and **Sungi Bungin bay (Telok Kersik),** lying southward of Chingkuk bay, afford good anchorage in moderate depths, but are small and open to westerly winds. About 6 miles south-eastward is situated Batang Kapas bay, having also good anchorage ground, but open to south-west winds.

OFF-LYING ISLETS AND DANGERS.—The islets and reefs lying between pulo Panyu and ujong Indrapura, from 5 to 15 miles off the coast, will now be described. Lat. 1° 36½′ S. Long. 100° 38′ E.

Ujong Raja is situated about 6 miles southward of Batang Kapas bay, and about one mile northward of it is pulo Karsik, about half a mile from the shore. Padangut reef, which breaks, lies 2½ miles northward of pulo Karsik and 7 cables from the shore.

Pulo Karaba Kechil lies 9½ miles south-eastward of pulo Panyu, and 5 miles from ujong Raja.

Gebua Tenga, with 2½ fathoms water over it and "steep-to," lies with pulo Karaba Kechil bearing E. by S. $\frac{7}{8}$ S. distant 5½ miles; a shoal, named Gebua Batang Kapas, with a depth of 12 fathoms over it, is situated S. by W. ½ W., distant 1½ miles from this reef.

Pulo Karaba Besar lies 4½ miles, S.W. ½ S., from pulo Karaba Kechil. A shoal, with 6 fathoms water over it, lies N.W. $\frac{7}{8}$ W., distant 1½ miles from pulo Karaba Besar. Lat. 1° 40′ S. Long. 100° 30¾′ E

General chart, 2,761 [2,540].

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Chart, 709 [2,538]. Lat. 1° 43½′ S. Long. 100° 35½′ E. Var. 0° 5′ E.

Pulo Gosong (Kersik) lies about 6 miles, S.E. $\frac{7}{8}$ E., from pulo Karaba Besar, and may be seen from a distance of 10 miles. Within a distance of 6 miles of pulo Gosong, and between the bearings of W.S.W. and South, there is a cluster of shoals, some of which break occasionally.

Gosong Nambi, which dries at low water, lies W. by S. $\frac{3}{8}$ S., distant 4½ miles from pulo Gosong.

Gebua Kechil, with 2½ fathoms water over it, is situated S.W. $\frac{3}{4}$ S., distant 3¼ miles from pulo Gosong, and Gebua Brankai, with 2¼ fathoms water over it, lies about one mile further in the same direction.

Gebua Lawas, on which the depth is 2 fathoms, is small and lies S. $\frac{5}{8}$ W., distant 5 miles from pulo Gosong.

PULO KATANG KATANG, or Tree island, lies S. ½ W., distant 10¼ miles southward from pulo Gosong, and is nearly 14 miles off shore.

Lat. 1° 53¼′ S. Long. 100° 34′ E.

LIGHT.—On the centre of the island a *white flashing* light, with a period of system of *half a minute*, is exhibited at an elevation of 65 feet above high water, which shows a *flash* of *five seconds* duration every *thirty seconds* and should be visible, in clear weather, from a distance of 13 miles.

Pulo Baringin, the southernmost of the chain of islands in this locality, lies 4 miles, E. by S. $\frac{5}{8}$ S., from pulo Katang Katang and 10 miles from the shore.

A reef, with 2¼ fathoms water over it, lies N.W. $\frac{5}{8}$ N., distant $1\frac{7}{10}$ miles from pulo Baringin.

A reef, on which the depth is 5 fathoms, is situated S. by W. ½ W., distant $1\frac{2}{10}$ miles, and another, with 4 fathoms over it, S. ½ E., distant 4 miles from the same island.

Lat. 1° 47′ S. Long. 100° 44¼′ E.

Gebua Gadang, a reef with one fathom water over it, lies off the coast 1¼ miles westward of Kampong Palangai Lama; about three-quarters of a mile northward of it there is a rock on which the depth is 1½ fathoms.

Gebua Pudong, a reef with 1½ fathoms water over it, lies 2½ miles, south-south-east of Gebua Gadang, and one mile from the coast.

Gebua Sumedang, a reef that dries, lies 1½ miles off the coast, with mount Lenggok (Linga) bearing E. by S., distant 7½ miles.

Southward and westward of this danger are three rocks, with depths of 1¾ to 2½ fathoms over them, and north-north-east of it, distant one mile, there is another rock with 2½ fathoms water over it.

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Air Haji river may be known by mount Lenggok (Linga), a remarkable sugar-loaf hill, 1,280 feet above high water, covered with trees and near the sea, about 5¼ miles north-north-eastward of the entrance, which is not easily made out. It is best to anchor in not less than 8 fathoms water, about 2¼ miles off shore, with the flagstaff bearing East. If north-westerly winds are apprehended, a sailing vessel should anchor in a depth of 12 or 13 fathoms in order to clear Indrapura point, should she be unable to remain, as this anchorage, which is little visited, is not considered safe with those winds. Chart, 709 [2,538]. Lat. 1° 51½′ S. Long. 100° 53½′ E. Var. 0° 5′ E.

The bar is dangerous for boats at low water, and at all times when there is a swell. The village is 2 miles up the river.

Pungasan village is situated on the coast at about 4 miles northward of Air Haji river; and Pasir Ganting, another village, lies just south of Indrapura river, at 4 miles southward of Air Haji river.

Anchorage may be obtained off Indrapura river, in 4 fathoms water, with the south point of the river mouth bearing E. ¼ N.

Ujong Indrapura, 14 miles southward of Air Haji river, is low and its extremity covered with trees; it is "steep-to," having a depth of 10 fathoms close to it. From hence to Benkulen there are no islands near the coast. Lat. 2° 9½′ S. Long. 100° 49′ E.

COAST.—Aspect.—Directions.—Proceeding southward from abreast Chingkuk bay it will be prudent, if coasting along, to keep 4 or 5 miles off shore when southward of ujong Raja, to avoid Gebua Sumedang and other reefs northward of it.

Mount Batutiga or Lakitan, 853 feet, and mount Sugirik, 820 feet above high water, about 2 miles within ujong Raja; mount Jalamu or Lakitan hill (343 feet), 8 miles to the south-eastward, and mount Lenggok, 11 miles farther in that direction, will be of much assistance in fixing the position of a vessel when navigating in this locality. At about 27 miles inland are the high peaks of Gunong Korintji, 12,678 feet above high water, and Patah Sambilan, 9 miles west-north-west of it. There appears to be no danger inshore between Gebua Sumedang and ujong Indrapura other than the shelving shore bank in the bight northward of that point. Lat. 1° 36½′ S. Long. 100° 40¾′ E. Chart, 2,761 [2,540]. Lat. 1° 43′ S. Long. 101° 15½′ E.

Southward of ujong Indrapura, in a sailing vessel bound to Benkulen, if the wind be steady, a direct course may be steered along the coast, keeping from 6 to 15 miles off; but with light winds it will be proper to preserve moderate depths, from 15 to 25 fathoms for anchoring, if requisite; never exceeding 30 fathoms, nor borrowing under 10 fathoms towards the shore, in case of getting into foul ground.

In the day time, with a good look-out aloft, most of the dangers will be visible; at night, a vessel should keep well outside all the islets.

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Chart, 2,761 [2,540].
Lat. 2° 35′ S.
Long. 101° 7′ E.
Var. 0° 5′ E.

Moko Moko lies in a small bay, about 32 miles south-eastward of ujong Indrapura, and was once a British settlement; the two points that form the bay are covered with tall trees.

Communication.—Moko Moko is connected with the telegraph system of Sumatra.

Sarang Alang reef, about 4 cables in length, in a N.E. by N. and S.W. by S. direction, and one cable in breadth, has 3 fathoms water over it, and depths of from 20 to 40 fathoms around, and lies W ½ N., distant 8 miles from Moko Moko; with a heavy swell the sea breaks on it.

A shoal, the existence of which is doubtful, is charted 3¼ miles northward of Sarang Alang reef.

Anchorage may be obtained in 10 fathoms water, over soft ground, with the flagstaff bearing E. by N., distant 2½ to 3 miles, and Moko Moko peak, which is remarkable, N.E. ½ N. Small vessels may anchor nearer the shore in a depth of 4½ fathoms.

Surf.—The native boats must be employed in landing, on account of the surf. The coast in the neighbourhood is a sandy beach on to which a heavy swell is generally setting, as is usually the case on this coast south of the equator.

The coast to the southward of Moko Moko, for a distance of 9 miles, is fringed by a reef which extends from one mile to about 1½ miles off shore.

Ayer Dikit, about 10 miles southward of Moko Moko, and a little southward of a bluff point covered with trees, may be recognised by the denseness of the trees on each side of the mouth of the river. The bar of the river is dangerous and unnavigable, even for boats.

Anchorage.—There is anchorage off the river mouth in from 8 to 10 fathoms water.

Lat. 2° 45′ S.
Long. 101° 18′ E.

Bantal river, 7 miles south-eastward of Ayer Dikit, may be known by two white cliffs a little to the northward of it; the village lies 5 miles northward of the entrance.

Anchorage.—The best anchorage in the road is in from 8 to 9 fathoms water, over ooze and sandy bottom, with the white cliffs bearing N.N.E. and the river entrance N.E.

Coast.—Between Bantal and Ipu are three rivers, the Tramang, Ayer Hitam, and the Retak; Tramang, the northernmost, has a small red cliff on the north side of the entrance; the coast, embracing those rivers, may be approached to about 12 fathoms, regular depths, in most places.

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Ipu village, 5 miles south-eastward of Retak river, may be known by three red cliffs to the southward, and three green hills near the sea. Chart, 2,761 [2,540]. Lat. 3° 1′ S. Long. 101° 28′ E. Var. 0° 5′ E.

Swallowfield rock, with 14 feet water over it and surrounded by depths of from 8 to 16 fathoms, lies S.W. by W., $\frac{1}{8}$ W. distant $3\frac{1}{2}$ miles from Ipu. Ipu, bearing northward of E. by N. $\frac{2}{3}$ N., leads northward of the rock.

Anchorage.—Large vessels may anchor in 9 or 10 fathoms water, with the central cliff bearing N.E. by E.; here the roadstead is tolerably clear, whilst farther in the bottom is foul.

COAST.—The coast southward of Ipu consists of reddish cliffs, and is fronted by a coral bank which stretches out 4 or 5 miles, with depths of 6 to 10 fathoms on its outer edge; it extends from Ipu to Ketahun, a distance of 30 miles, and should not be approached under depths of 10 or 12 fathoms, as it is "steep-to."

Ketahun village has a white cliff to the southward like a castle.

Nearly midway between Ipu and Ketahun there is the small village of Seblat, appearing like an opening betwixt reddish cliffs; Ketahun has a similar appearance.

Lais and Palik are two small villages situated at 17 and 23 miles south-eastward of Ketahun, with red cliffs between them.

A shoal, with about 2 fathoms water over it, and not breaking, is reported to lie about half a mile from the coast before the mouth of the Palik river.

From Ketahun the distance is 36 miles to Benkulen, and the coast in this space is safe to approach in places to 11 or 12 fathoms, the depths being more regular than farther northward; from 12 to 20 fathoms are good depths to preserve when coasting.

BENKULEN, an open port, was formerly the principal British settlement on this coast, but with the advance of Singapore, trade declined so much that it was finally given up. The settlement was first formed on the banks of the river, but the locality being so unhealthy, it was removed to ujong Karang or Tapu Padri, the south point of the bay, where fort Marlborough was built on ground a little more elevated in the year 1865. Plan, 2,761 [2,540]. Lat. 3° 47′ S. Long. 102° 15½′ E.

The town is neat and pleasantly situated on the seashore upon gently undulating land, and behind it lies the drill ground, surrounded by broad roads covered with white sand and bordered with fine lawns; close to is the spacious dwelling of the Resident. In 1900 the population of Benkulen was 6,705, of which 101 were Europeans

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Chart, 2,761 [2,540]. Var. 0° 5′ E.

Benkulen river falls into the bay about 1½ miles north-eastward of the town, has from 4 to 6 feet on the bar, and from 8 to 12 feet within.

Pulo Tikus or Rat island lies about 5 miles south-westward of Benkulen, and is surrounded by a coral reef about 2 miles in extent in a north-west and south-east direction, partly dry at low water, affording shelter from westerly winds. Detached patches with depths of 4½ fathoms over them lie E.N.E. of the main reef, at about three-quarters of a mile from the lighthouse. The island is low and small, with a lighthouse, a few palmyra trees 80 feet high forming a clump, and a useful landmark; also some houses for receiving pepper, a small battery for its protection, and a landing stage.

Lat. 3° 51′ S. Long. 102° 10½′ E.

LIGHTS.—On pulo Tikus, from an iron frame on a stone dwelling, 46 feet in height and painted white, a *white fixed* light is exhibited at an elevation of 52 feet above high water, which should be visible, in clear weather, from a distance of 12 miles.*

At Benkulen, north-eastward of the tower of fort Marlborough, a *red fixed* light is exhibited from an iron support, 26 feet in height and painted white, at an elevation of 59 feet above high water, and, in clear weather, should be visible between the bearings of N. 78° E., through east, to South, from a distance of 4 miles. The keeper's dwelling, a stone building, has a red roof.

Communication.—The Netherlands Royal Packet Company's steamers, running between Batavia, Padang, and Penang, call fortnightly; telegraphic communication by land lines with other ports in Sumatra. *See* Chapter I., page 21.

Supplies.—Bullocks, poultry, fruit, and vegetables of various kinds may be obtained here, and water from a cistern near the landing place.

Landing.—The landing place is protected from the sea by a rocky ledge fronting it at a distance of 150 yards; boats pass round the eastern point of this ledge, and then haul in to the southward for the wharf, which is about 60 feet long, with a depth of 3 feet alongside at low water.

Weather signal.—A blue flag is hoisted on the iron standard of the harbour light at the town whenever it is dangerous for boats to go in or out.

Climate.—The town is unhealthy. Rain is frequent during the months of January and February, the westerly monsoon period. *See* p. 33. Land and sea breezes prevail here.

Dangers.—Gosong Sungi Lamu, lying about 1½ miles south-west from ujong Pedati, is the northernmost shoal in the approach to

General chart, 2,761 [2,540].

* To be altered to a *white flashing* light every *five* seconds.

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Benkulen. The least water is 2½ fathoms, with 5 to 7 fathoms at a short distance. Chart, 2,761 [2,540]. Var. 0° 5′ E.

Gosong Patah Sambilan, or North and South breakers, are two dangerous reefs which dry in parts at low water and lie from half a mile to 1½ miles off the town. They do not always break, but as they are liable to do so suddenly, boats should not attempt to cross them.

Middle shoal, with a least depth of about 3 fathoms and 8 to 9 fathoms close-to, lies nearly midway between the South Patah Sambilan and Gosong Lampuyang.

Gosong Lampuyang, two reefs, at about 1½ miles south-south-eastward of Middle shoal, are generally discernible by the sea breaking on them; between them and the shore the depth is 8 fathoms. These reefs are avoided by keeping in more than 11 fathoms water.

Karang Bayan and Karang Ikan Tandu are two reefs nearly connected, with depths of 5 and 6 fathoms, and situated between West and W.N.W. of pulo Tikus, distant 2 to 2½ miles; between these reefs and the reef surrounding pulo Tikus there are depths of 16 fathoms.

Karang Lebar, or Asia shoal, the southern shoal in Benkulen road, is about one mile in extent in an east and west direction, with a depth of 4 fathoms (probably less) over coral and sand, and lies about 4 miles westward of ujong Siabung. There is a heavy ground-swell on it, which sometimes breaks in bad weather. Lat. 3° 56½′ S. Long. 102° 12′ E.

Buoys.—A nun buoy, painted red and surmounted by a staff and ball, marks the north-east edge of Gosong Patah Sambilan.

A nun buoy, painted red, marks the edge of the 5-fathoms contour line off the coast, and is situated about two-thirds of a mile eastward of the preceding buoy. The buoys are not to be depended on.

Benkulen road may be considered as lying between ujong Padati, 5 miles northward of Benkulen, and ujong Siabung or Buffel point at about 7 miles to the southward, forming on either side of the town a large bay.

Inner road.—The inner road, with from 4 to 6 fathoms water, lies north-westward of the fort, and within Gusong Patah Sambilan; it is frequented by small vessels in the fair season, for the convenience of loading and unloading. The approach from the northward is between the buoys already mentioned; the southern entrance, between the south Sambilan and the shore, has depths of from 3 to 6 fathoms, but is not buoyed.

Pulo Tikus basin.—There is an excellent basin in the north-east side of Tikus reef, with depths of from 5 to 7 fathoms, over soft mud,

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Chart, 2,761 [2,540]. Var. 0° 5′ E.

and 3 to 2½ fathoms at its upper end. The passage in is close to the edge of the reef on the west side; several detached rocky patches lie off the east side, with 7 and 8 fathoms water close-to.

Sailing vessels having a cargo to receive or deliver at Benkulen used generally to warp into this basin, where they moored head and stern to anchors laid upon the reef, which is "steep-to." From this basin goods were conveyed to or from Benkulen, with the same facility as from the road, the boats being able to make one trip daily with the land and sea breezes. Here vessels were completely sheltered from the sea by the reef; whereas it often runs so high in the road that goods are unsafe in the boats alongside. N.W. winds sometimes give very short warning of their approach. At present most of the trade is done by small coasting steamers who would use the Inner road.

N.W. winds, which prevail from September to March, send a heavy sea sometimes into the road.

In this season, vessels that do not go into pulo Tikus basin should anchor eastward and within a mile of Tikus lighthouse, in about 15 fathoms water, where the sea will be partly broken by the reef. Loading and discharging cargo may be done from this position in favourable weather as if a vessel were in the usual anchorage in the road; for sailing boats, passing to and fro from the town, are confined to one trip in 24 hours by the land and sea breezes.

Anchorage.—The usual anchorage is in about 12 or 13 fathoms water, at about one mile eastward from pulo Tikus. Under that depth the bottom is generally rocky, and also farther out it is foul in places. Vessels during southerly winds may anchor in 13 fathoms under shelter of Tikus reef, over mud bottom.

The anchorage in the Inner road is in 6 fathoms water, with Benkulen point bearing S.E. ⅛ E. and pulo Tikus S.W. ⅛ S.

Lat. 3° 35½′ S. Long. 102° 25′ E.

Aspect.—North-eastward of the river the land is high and rugged; one of the hills, named Bunkuk or Sugar-loaf, about 3,278 feet above high water, is a conspicuous mark in some directions from seaward.

Lat. 3° 15½′ S. Long. 102° 14½′ E.

Lumut mount, 7,097 feet, and mount Dempo, 10,237 feet above high water, and 72 miles south-eastward of it, are peaks on the same range of hills. Northward of this range is another named Ambong Bras Gebergte, on which is Gunong Korintji, before mentioned.

Directions.—Approaching Benkulen road from the northward, bring pulo Tikus to bear southward of S.E. by E. to avoid Karang Bayan and Karang Ikan Tandu; the clump of trees on the island should be visible from distances of between 12 and 15 miles. Mount Bunkuk, bearing N.E. by E., or eastward of that bearing, until pulo Tikus light-

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house bears S.E., leads northward of them, whence course may be taken for the anchorage in the road or for Tikus anchorage. Chart, 2,761 [2,540]. Var. 0° 5′ E.

In working to or from the road by this channel, a sailing vessel may stand near the edge of pulo Tikus reef, and to 13 fathoms towards the Sumatra coast.

Coming from the westward, the trees on pulo Tikus will be seen before Mount Bunkuk which is more conspicuous on a nearer approach.

Approaching the road from the southward, pulo Tikus should not be brought to bear to the westward of N. ½ W. until within 3 miles of it, which will lead westward of Karang Lebar; when steer N.N.E. for the road. There is a channel 3 miles wide, within Karang Lebar, with general depths of 17 fathoms. Vessels using this channel should keep within 2 miles of ujong Siabung until it bears East, and may then steer for pulo Tikus anchorage; ujong Siabung may be approached to the distance of about a mile when working in, for a reef projects from it about a third of a mile, with 3 fathoms on its edge, and the 5-fathoms contour line is distant half a mile from the point with 13 to 14 fathoms close-to. Karang Lebar may be seen by the overfalls on its edges.

Tides.—It is high water, full and change, at Benkulen at about 6 hours; springs rise from 3 to 5 feet.

Pulau bay, 7 miles to the southward of Benkulen, was formerly an excellent land-locked harbour, 2 miles in length by one mile in breadth. It had an entrance about 2 cables wide, with a depth of 3½ fathoms, but as this has silted up it is no longer available as an anchorage.

Selebar river, about one mile north-eastward of Pulau bay, has 4 feet water on its bar; within the bar it forks, stretching both northward and southward, near and parallel to the shore, the southern branch leading to a lake contiguous to the sea, south-eastward of Pulau bay.

Ujong Siabung, or Buffel point, the south point of the bay, is high and densely wooded; the coast reef surrounding it extends for about half a mile. Lat. 3° 55½′ S. Long. 102° 15′ E.

Ujong Kungkaai, or False Buffel point, a round bluff headland covered with high trees discernible from Benkulen road, is about 2½ miles southward of Pulau bay.

About 4 miles S.S.E. ½ E. of this point and 2 miles off shore, there is a patch with a depth of 7 fathoms over rock, and 12 fathoms between it and the shore.

COAST.—General remarks.—From ujong Kungkaai the coast of Sumatra extends, in a south-easterly direction for a distance of

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Chart, 2,761 [2,540]. Var. 0° 5′ E.

183 miles, to Flat cape at the western side of the entrance to Sunda strait. Throughout its extent it is almost entirely without shelter, and being beaten by heavy surf the few frequented places are dangerous for landing. The country is also deficient in some of the productions which are found north of the equator. It is generally bold and safe to approach, and the land is mountainous a short distance in-shore.

Between Benkulen and Mana, regular depths over a sandy bottom are found, where, if it fall calm and the current be unfavourable, a sailing vessel may occasionally find anchorage in moderate depths. Farther to the southward the coast becomes more steep, moderate depths extending out only a short distance, until Little Fortune island, near Flat point, is approached, where they extend 8 miles from the Sumatra coast.

Pring, situated about 35 miles south-eastward of ujong Kungkaai, is a small pepper port; the best anchorage is in 12 fathoms water, over mud. In less depth the ground is foul and rocky. A shoal, which breaks in bad weather, extends about 2 miles off shore.

Lat. 4° 28′ S. Long. 102° 54′ E.

Mana point, situated about 17 miles south-eastward of Pring, is densely wooded, projects considerably, and may be known by a small hill with palmyra trees on it; a reef extends more than a mile south-westward of the point, which should be given a wide berth.

Mana town, formerly an English settlement, lies north-eastward of the point.

Reef.—A reef, with 3 fathoms water over it, lies outside the coast reef N.W. ½ N., distant one mile, from Mana point and 8 cables from the shore.

Beacons.—Close to the eastward of Mana point, there is a bamboo beacon on a hill about 100 feet above high water, and another beacon, surmounted by a ball, stands on the beach; both are painted white.

Anchorage may be obtained, in 5 fathoms water, with the two bamboo beacons, bearing E. by S. ½ S.

Pino, another pepper port, lies about 5 miles north-westward of Mana, and Pedang at about 15 miles south-eastward. A small cascade falls perpendicularly from the steep cliffs which line the shore near Mana, but landing should not be attempted as a heavy surf generally prevails along this coast.

Plan, 866 [2,541].

KAWUR or SAMBAT BAY, between Bandar and Linau points, is about 5 miles in width, and on its south-east side is Linau (Kawur) settlement, situated on the north side of a bight half a mile wide, where small craft find shelter from southerly winds.

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LIGHT.—On Bandar point an open ironwork frame support, 42 feet in height and painted white, exhibits, at an elevation of 49 feet above high water, a *white group flashing* light showing groups of three flashes *every thirty seconds* thus:—flash, *three seconds;* eclipse, *three seconds;* flash, *three seconds;* eclipse, *three seconds;* flash, *three seconds;* eclipse, *fifteen seconds;* it should be visible in clear weather from a distance of 12 miles, from N. 85° E., through north and west, as far as Bintuan roadstead, but is obscured to the south-eastward by Linau point. Plan, 866 [2,541]. Lat. 4° 48½′ S. Long. 103° 20′ E. Var. 0° 5′ E.

Beacon.—On Bandar point, there is a wooden beacon, 65 feet in height, painted white and surmounted by a ball.

Anchorage.—In the north part of the bay, westward of Sambat river, off Bandar village, there is good shelter from N.W. and westerly winds, in 9 or 10 fathoms water, over sand and mud bottom.

The anchorage off Linau is in 11 or 12 fathoms water, with Linau point bearing about S. by W. ¾ W. The narrow boat passage leading to the factory is between two coral reefs, which break at times.

PULO PISANG HARBOUR.—Pulo Pisang Kru, a quartz rock, somewhat low and slightly wooded, is about one mile in diameter, and lies about 30 miles south-eastward of Linau and 1¼ miles off shore; the intermediate coast is "steep-to." Plan, 866 [2,541]. Lat. 5° 7′ S. Long. 103° 49′ E.

A reef, which extends in places about one-third of a mile, and on which the sea continually breaks, fronts the southern half of the island, with depths of 36 to 40 fathoms about a quarter of a mile off. Shallow water, with about 3 fathoms over the visible patches of coral rock, extends from the north-western extreme of the island towards the main.

At about one mile northward of pulo Pisang Kru is a reef of rocks, on which the sea generally breaks, having from 7 to 20 fathoms close-to, and apparently connected with the shore, which is distant about 1½ miles; 5 miles northward of it is a shallow patch at about one mile off-shore.

Anchorage.—Between pulo Pisang Kru and the Sumatra coast, there is good anchorage and shelter from N.W. and westerly winds, in from 12 to 15 fathoms water, with the rocks near the east part of the island bearing South, distant about 3 cables, and at three-quarters of a mile from the main.

Directions.—Mount Pugung, a high and remarkable mountain, 6,562 feet above high water, situated about 12 miles northward of pulo Pisang Kru, may be discerned a considerable distance from the offing. Vessels should approach the anchorage under pulo Pisang Kru from the southward; there appears to be no dangers to avoid excepting the reef extending a short distance from the island. Small craft may enter by Lat. 4° 55′ S. Long. 103° 52′ E.

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Plan, 866 [2,541]. Var. 0° 10′ E.

the northern channel by keeping at about 2 cables distant from the island shore.

Kru road lies 6 miles south-eastward from pulo Pisang Kru, at the head of a bay which has deep water, there being about 30 fathoms at less than half a mile off shore in places. The town is situated on the bank of a small river navigable by boats at high water, entered close to the eastward of Salobu point, the south point of the road, which is visible for some distance from the offing.

Lat. 5° 11′ S. Long. 103° 56′ E.

LIGHT.—An open ironwork frame support, 42 feet in height, painted white, and situated on Salobu point, exhibits, at an elevation of 115 feet above high water, a *white group occulting* light with a period of system of *thirty seconds*, showing light for *fifteen seconds;* eclipse, *three seconds;* light, *three seconds;* eclipse, *three seconds;* light, *three seconds*, and eclipse, *three seconds;* it should be visible, in clear weather, from a distance of 16 miles, between the bearings of S. 61° E., through east, to N. 44° E. (75°).

Communication.—The Netherlands Royal Packet Company's steamers running between Batavia, Padang, and Penang call fortnightly.

Supplies.—Bullocks, good water, and some other supplies may be procured here.

Dangers.—Jati rock, of coral, with $2\frac{1}{4}$ fathoms least water over it, is about a cable in length in a north and south direction and half a cable in breadth, and lies N. $\frac{1}{2}$ W., distant 8 cables from Salobu point and about 4 cables off shore.

Foul ground extends from Salobu point for a distance of 2 cables, with deep water close-to.

Buoy.—A nun buoy, painted red, is moored, in 3 fathoms water, on the southern edge of Jati rock.

Anchorage.—The anchorage in Kru road is in from 15 to 18 fathoms water, over hard sand, westward of the mouth of the river, with Salobu point bearing about S.E. by E., distant 5 cables, and Karang Pinggan point S.S.W. It is safe in the S.E. monsoon, being well sheltered from these winds by Karang Pinggan, the south point of the bay.

Plan, 2,761 [2,540]. Lat. 5° 20′ S. Long. 104° 0′ E.

Tenumbang bay lies about 8 miles south-eastward of Karang Pinggan point, with shallow water extending about one mile off shore between.

An extensive reef, which generally breaks heavily, lies on the north-west side of the bay.

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Landing.—There is a surf and breakers on the whole of the steep coast, but landing may be effected in S.E. winds on the south side of the bay, between a reef and the shore. Chart, 2,761 [2,540]. Var. 0° 10′ E.

Anchorage.—There is anchorage, about half a mile from the shore, in about 10 fathoms water, over sand and mud, about N. by E. ½ E. from the south point of the bay and near Padang Manis village.

Bengkunat bay is about 20 miles south-eastward of Tenumbang bay, and Bengkunat village lies on the north side of a low point having on it palmyra trees; Sigen point, the north-west extremity of the bay, has a projecting reef, with 20 fathoms close-to, and the bay is interspersed with rocks. Lat. 5° 30′ S. Long. 104° 6′ E.

Dangers.—Several reefs lie in the bay, and 3 miles in a west-south-west direction, from the south point, is the south extreme of an extensive reef which is 6 miles in length in a N.W. by N. and S.E. by S. direction; there is a passage for small vessels, between it and the shore.

About 5 miles southward of the bay and 3 miles from the shore there is a reef over which the depth is 4 fathoms.

Anchorage.—A vessel intending to touch at Bengkunat should anchor well out to avoid rocky bottom.

Coast.—The coast here and farther to the southward is generally low, but inland the country is mountainous.

Between Bengkunat and Little Fortune island depths o from 10 to 20 fathoms will be found at 2 or 3 miles off shore.*

ISLANDS OFF THE WEST COAST OF SUMATRA.

GENERAL REMARKS.—A chain of islands extends parallel to the west coast of Sumatra at the distance of about 60 miles between the parallel of 3° N. and 2° S., covering a space nearly 700 miles in length; they are for the most part unsurveyed.

PULO SIMALUR (Pulo Babi), the northernmost of the large islands, is about 54 miles in length, with a breadth varying from 5 to 14 miles, and is about 60 miles from the Sumatra coast; it is hilly, Sibahu, the highest peak, being 1,870 feet above high water. The coasts are mostly rocky, and there are many off-lying islands, islets and reefs. The island is everywhere wooded, as are most of the smaller islands. Plan, 2,201 [2,536]. Lat. 2° 33′ N. Long. 96° 17′ E.

A number of small rivers run into the bays, but few will admit even boats.

General charts, 2,761 [2,540] and 2,760 [2,534].

* For the description of Little Fortune island, and coast from Flat cape, *see* Sunda strait, page 416.

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Chart, 2,201 [2,536]. No variation.

The reefs near to, and between, the coral islets are "steep-to" and, with the exception of those near pulo Siumat, show up distinctly. The soundings round the island vary greatly, so that the lead is very little guide in approaching the land.

From May to December the coasts of Simalur, especially the south, west, and east coasts, are mostly inaccessible; almost everywhere the surf runs high, and the reefs, even those with not less than 5 fathoms water over them, can always be distinguished by breakers.

At other times of the year there is frequently considerable surf on the coast, and the swell is always troublesome.

A considerable quantity of rain falls throughout the year.

Inhabitants.—The island is thinly populated; the inhabitants, estimated at about 5,000, principally reside in small villages near the coast; besides these, about 600 Malays and Achinese have settled there.

The original inhabitants are divided into different tribes, each one of which has its own language, but Malay is generally understood.

The inhabitants are very primitive, and their only wealth consists in the possession of water buffalo, the number of which is, they say, greatly on the decrease, as the Achinese resident on the island steal these beasts, and either kill or export them.

Trade.—The trade, which is but small, is principally with Singkel, Baros, Susu Susu, Tampat Tuan, and Penang.

The imports appear to be confined to cloth, manufactured goods, earthenware, ironwork, and tobacco. In most places the paying medium now consists of copper money, unless the trading is carried on by means of barter.

The principal productions are rattan, damar, gutta-percha, copra, cocoa-nuts, hides, scented woods, tortoise shell, buffaloes and goats, but only the coast land is under cultivation.

The islands around Simalur are of coral formation, and all, with the exception of pulo Siumat, have no settled population, though there are numbers of cocoa-nut and fruit trees.

Lat. 2° 56¾′ N. Long. 95° 50′ E.

Tanjong Liwa, the northern point of Simalur, is easily recognised when coming from the eastward. On the north and east sides the bottom for over a mile is rocky and uneven, with some shoal spots.

Liwa bay is situated a short distance to the eastward of the point. In the middle of the bay there is a sandbank, with but little water over it, and between this and tanjong Liwa there is a reef on which the depth is 3 fathoms. On the east side of the bay is a sandbank, partially overgrown, connected with the shore, and west-north-westward of it a reef has 10 feet least water over it.

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Sibobe village stands in the eastern part of the bay near a lagoon, and Liwa village near tanjong Liwa. Chart, 2,201 [2,536]. No variation

Van Rossum reef, with less than 3 fathoms water over it, lies N. by E. ¼ E., distant about a mile to the northward of the east point of Liwa bay, shows discoloured water, and sometimes breaks.

Anchorage.—The deepest part of the bay is a basin with a greatest diameter of half a mile, in which there is good anchorage in 20 fathoms water, over mud, with the east point of the bay bearing E. ¾ S. The passage to this basin is, however, narrow, and on the eastern side it is bounded by a reef that nearly dries.

Directions.—Coming from the eastward or north-eastward, both sandbanks may be seen, and with the eastern bearing S.S.E. ⅔ E. and the western W. by S. ¼ S., a course about South should clear the 10 feet reef, when the anchorage may be steered for.

COAST.—From tanjong Sangiwa, which has a large village eastward of it and lies about 2 miles to the eastward of Liwa bay, the coast trends to the south-eastward for about 1¼ miles to tanjong Sibalung, and then turns south-south-east for 2 miles to tanjong Semigu. Lat. 2° 55′ N. Long. 95° 54′ E.

Pulo Kichik and pulo Penju, two islands apparently connected by a reef, lie south-eastward of tanjong Semigu, leaving, between that point and the former island, a narrow channel.

Dangers.—Discoloured water has been reported one mile eastward of tanjong Sangiwa, and a reef extends about 5 cables westward of tanjong Semigu.

Lugo Bigo bay has an entrance about 1½ cables in width, about a mile south-westward of tanjong Semigu, inside which it expands into a large bay in which are three islets; several lagoons communicate with the bay, and on its shores are Kaulo, Mikim and Baba Lugu villages. Lat. 2° 50½′ N. Long. 95° 55½′ E.

Except near the shore and the islands the bay appears to be clear of dangers, and in the centre the depths are from 16 to 20 fathoms.

The best approach is between pulo Penju and pulo Hulawan, keeping nearer the former island and giving the southern point of the entrance channel a berth, as some dangers lie near it.

Sigulei bay is 4½ miles south-eastward of tanjong Semigu, and off the bay lie pulo Hulawan and pulo Galagala, the latter connected by a reef, with less than a foot water over it, to a sandbank, in part overgrown with vegetation, named Karang. Near these islets, and probably inside

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Chart, 2,201 [2,536]. No variation.

them, there is foul ground; Hulawan and Galagala can be approached close to on their eastern sides.

Dangers.—Two reefs, one with a rock that dries, and the other with a depth of 2 fathoms over it, lie south-south-westward of pulo Hulawan, and between it and Karang. A coral reef, with 3 feet water over it, lies about a mile west-south-west of pulo Hulawan, and south-west of this reef, discoloured water was seen.

Anchorage may be obtained, in a depth of 16 fathoms, in Sigulei bay with the west point of pulo Galagala bearing North and tanjong Sigulei E. by S. $\frac{3}{4}$ S. Off Lamameh village, which is situated near tanjong Sigulei, the south-east extreme of the bay, there is good anchorage in 15 to 17 fathoms water, over mud.

The river Sigulei falls into the sea near the point of that name, off which is a sandbank that extends for about 2 cables. Sigulei village is situated on the river near the mouth.

Reef.—A reef, with a least depth of one fathom, lies E. $\frac{1}{8}$ S. distant 7 cables from tanjong Sigulei.

Coast.—The coast from tanjong Sigulei trends to the south-eastward towards tanjong Sembilang, near to which is a large village. Pulo Asu, lying off this point, is overgrown with vegetation and surrounded by a narrow reef.

Lat. 2° 46′ N. Long. 96° 2¾′ E.

Dangers.—A reef, with one fathom water over it, lies about 2¼ miles E. by S. from pulo Asu, and discoloured water was observed between the reef and the island, depths of from 5 to 8 fathoms being found southward of it.

Coast.—Southward of pulo Asu there is a small bay named Lo Ungkun, where good anchorage may be obtained, and from this the coast still maintains a south-easterly direction for 5½ miles to tanjong Siango, southward of which is Lugu Ama Siango, a bay about 2 miles deep; a reef extends 3 cables off tanjong Siango.

TELOK DALAM, a bay entered 4 miles southward of tanjong Siango, penetrates about 4 miles into the island, and is 6 miles long in a north-west and south-east direction.

Lat. 2° 39′ N. Long. 96° 11′ E.

It can easily be made out from seaward by Langeni hill (427 feet above high water), which lies on the southern side of the entrance, and also by pulo Lampau or Baba, in the middle of the entrance, which island is covered with palmyra trees and has a conspicuous tall tree standing alone, near its north-west point. Pulo Balung, a small island, lies about three-quarters of a mile south-west of pulo Lampau and has a shoal with 8 fathoms water over it, about 2 cables N. by W. of it.

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The bay is clear of dangers, with the exception of a reef, upon which there is 3 fathoms water, situated in its south-eastern part. Chart, 2,261 [2,536]. No variation.

The general depths are from 20 to 25 fathoms, muddy bottom, whilst outside, off the bay, the depths are from 40 to 50 fathoms, bottom grey sand with shells and coral.

The coastline is broken up into a number of small bays, and is also fronted by many small islets, which, on account of being only a short distance from the coast, are not noticeable.

On the south side of the bay is a range of hills about 1,200 feet above high water, and to the south-eastward is Kwala Baru mountain (1,250 feet), whose slopes also come down to the shore of the bay. Lat. 2° 35½′ N. Long. 96° 14½′ E

Lugu Langeni, a small village, is situated on the west side of the bay, opposite the entrance, and pulo Lampau is inhabited.

Directions.—The approach between the north point of the bay and the reef that extends to the north-eastward from the opposite shore, is about half a mile in breadth and clear of danger; the northern side of the fairway is, however, to be preferred, in order to keep clear to the above-mentioned reef; pulo Lampau can be passed on either side.

COAST.—The coast from Telok Dalam follows a general south-easterly direction as far as Telok Lingi, a distance of 14 miles.

For the first 2½ miles a reef extends to a distance of more than a mile from the coast, and on it are many rocks above water, some of which have vegetation on them. The reef then recedes, forming a bight, on the eastern side of which it again extends out in the form of a spit to a distance of 2 miles; on the outer end are many rocks, above and below water, and on the inner end, at a distance of about half a mile from the shore, is pulo Pinang, between which and the shore are more rocks above water and a small islet, but to the south-eastward of the island the reef extends but a short distance from the coast.

A large detached reef lies E. by S. about a mile from pulo Pinang; on the margin are Cornelis rocks above water, which may be seen from some distance.

Anchorage with a muddy bottom can be obtained either to the northward or southward of pulo Pinang, but the approach is difficult on account of the reefs.

Coast.—Kwala Baru is the mouth of a rapid stream, having its source in the Sibahu mountains; near it is a village of the same name.

From a short distance from this village the coast is fronted by an unsurveyed area, containing many reefs extending to a distance of nearly 5 miles. The north-western and south-eastern edges of this

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Chart, 2,201 [2,536]. No variation.

area are marked by several small islets, and to the north-eastward of it, separated by a deep channel about three-quarters of a mile in width, is pulo Siumat.

The islets lying off this coast are low, formed of coral, and more or less overgrown with brushwood or trees, with the exception of Talam, Limau and Tupa, the north-western ones, which are rocky, have tall trees growing on them, and are situated near the northern edge of the unsurveyed area.

Uma village, situated in a small bay, is the only one on the coast between Kwala Baru and Telok Lingi : a mission here, the roof of which, when the sun shines on it, forms a good landmark.

Lat. 2° 41¼′ N. Long. 96° 19′ E.

Dog reefs, a cluster of coral reefs, with apparently depths of from 2 to 3 fathoms over it, and showing discoloured water, were observed from a position with Langeni hill bearing W. by S. ½ S., and the north point of pulo Siumat S.E. by E. ½ E. From this position the reefs extended about 5½ cables in an easterly, and about 3 cables in a southerly, direction and about 1½ cables in other directions.

Pulo Siumat, lying about 6 miles to the northward of Telok Tingi, is over 2½ miles in length, with a breadth of about half a mile.

It is covered with tall trees, the tops of which attain an elevation of 352 feet, and is the only island off the coast of Simalur that has a settled population, who cultivate the cocoa-nut, the nutmeg, and the cotton tree.

Reefs extend from the western end of the island to a distance of about 8 cables, from the northern coast to about 6 cables, and from the eastern point to about 3 cables. On the two latter are rocks showing above water.

There are two rocks above water at a short distance to the south-eastward of the south point, and at a distance of 4 cables, S.W. ⅔ S. from the same point, a depth of only 15 feet was obtained. The soundings for a distance of half a mile from the south coast being very irregular, it is possible that many shoal patches exist that give no sign of their position by discolouration of the water.

Anchorage.—There is a village on the south side of the island, off which, at a distance of about half a mile, there is anchorage in from 24 to 27 fathoms of water.

Islets.—On the south east margin of the unsurveyed reefs are several islets.

Lat. 2° 36¼′ N. Long. 96° 23′ E.

Pulo Mentari, the northernmost, has some brushwood growing on it and is conspicuous from a distance by its white sandy beach ; it is surrounded by a reef on which are some rocks above water.

Pulo Kasik, about three-quarters of a mile southward of pulo Mentari, has very light-coloured vegetation, whilst pulo Tupa, the next island to

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the southward, is the only one in the locality having cocoa-nut palms; pulo Tamban, further south, has very little vegetation. Chart, 2,201 [2,536]. No variation.

Telok Lingi is, as far as is known, clear of dangers, and affords good anchorage in from 15 to 20 fathoms water, over mud. An islet, overgrown with tall trees and some cocoa-nut palms, is so close to the northern entrance point as to appear to be connected with it.

On the south-east side of the bay, upon a hill, is a large tree, 462 feet above high water, which is conspicuous from a distance. A narrow channel exists to the southward of this hill, leading to Sinabang bay. Lat. 2° 31′ N. Long. 96° 23′ E.

A small islet, covered with tall trees, lies in the middle of the entrance to the bay; it can be passed close to on either side.

There are two bights in Telok Lingi, in the southern of which from 4 to 6 fathoms are found, but the entrance is narrow.

Dangers.—Pulo Ketek and pulo Naru are two islets lying to the westward of the fairway to Telok Lingi. They are both surrounded by broad coral reefs; that extending south-eastward from pulo Ketek, being marked, near its edge, by rocks above water. Pulo Naru has a tall, dead tree on it standing above the others, and near it lies an atoll shaped islet with several clumps of small trees. Two other small islets lie northward of the entrance to Telok Lingi, and are surrounded by reefs with rocks above water and awash.

Pulo Jawi Jawi, south-eastward of Sumbawa reefs, is a small, low, round island, with brushwood growing in places, and from a distance has the appearance of three islands; about 2 cables off its east and west sides there is a small rock, and others lie between it and Telok Lingi; a small islet situated 7 cables, W. by S., from Jawi Jawi has some thick, high trees in the form of a triangle; and another, which lies in the middle of the entrance, is also overgrown with high trees.

Pulo Babi, 80 feet above high water, lies about 1¼ miles south-eastward of pulo Jawi Jawi and is an overgrown atoll; several dangers lie near the island.

Pulo Ragasan, half a mile south-westward of pulo Babi, is low and overgrown with shrubs; between it and pulo Babi there is a depth of 7 fathoms.

Sumbawa reefs are four in number, and lie in front of Telok Lingi, between Ketek and Jawi Jawi islands. The shoalest of these reefs has a least depth of 10 feet over it, and lies with the south-west point of pulo Babi in line with the north point of pulo Jawi Jawi; the deepest has as much as 5 fathoms.

Directions.—Vessels bound for Telok Lingi, after ascertaining their position off pulo Babi or pulo Jawi Jawi, must navigate by eye, between

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Chart, 2,201 [2,536]. No variation.

the reefs and islets that stud the approach for a distance of 1½ to 2 miles from the shore.

Plan, 2,284 [2,535]. Lat. 2° 28½′ N. Long. 96° 24¼′ E.

SINABANG BAY, entered about 1¼ miles southward of pulo Babi, is half a mile wide in the entrance and extends in for a distance of about 3 miles, and for about 2 miles of its length, at which distance is the village of the same name, the depths are considerable. The fairway to the anchorage, between the dangers lying near pulo Babi and a reef extending north-eastward of the eastern entrance point, is deep, but requires a careful look-out from aloft.

Islets.—Four small islets lie off the coast between Telok Lingi and Sinabang bay; the northernmost has brushwood of a light colour; the southernmost is overgrown with tall trees, and the other two are small banks with brushwood growing on them.

Beacons.—Two iron screw pile beacons, each surmounted by a truncated cone, painted black, mark the edge of the coast reef on the eastern side of the entrance and of the anchorage; the outer, in 10 feet water, is situated West from the north-western of two small islets which lie near the northern extreme of the reef extending north-east from the eastern entrance point.

A similar beacon, but surmounted by a ball, painted white, is placed in 12 feet water on the south-east side of the islet to the southward of pulo Babi and W. by N. distant about 3½ cables from the outer black beacon.

Anchorages.—Good anchorage may be obtained in from 6 to 8 fathoms water off Sinabang village and to the southward of a small island; or in depths of 15 to 19 fathoms, about one-third of a mile north-east of the village. There is a small river near the village.

Directions.—For sailing vessels larger than praams this part of the coast may be said to be impracticable, on account of the many calms, "steep-to" reefs, and the currents. For steamships using the necessary precautions it presents no great difficulties.

Vessels bound to Sinabang bay from the southward can easily recognise their position by Batu Belayar, the rock situated off the east point of Simalur.

From abreast this point course can be shaped to pass on either side of pulo Medanga; if passing inside, keep near the island in order to avoid the reef that here extends to a distance of 7 cables from the shore. Steer to pass about half a mile eastward of pulo Babi, and bring the zinc roof of a house, at Sinabang village, between the eastern end of Panjang Kechil and tanjong Babang, the eastern entrance point, bearing about S.S.W. ¾ W., and passing between the beacons marking the reefs on

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either side of the entrance to the bay, steer for the anchorage, leaving the inner black beacon on the port hand. Chart, 2,201 [2,536]. No variation.

From the northward, vessels sight pulo Siumat, 359 feet above high water, and after rounding its east point, at a safe distance to avoid the reef extending from it, can steer for pulo Babi, from whence course may be shaped for the bay, as before.

Should pulo Babi not be recognised at first, course should be shaped for pulo Medanga until it is made out.

Tides.—The average rise of the tide amounts to about 4 feet.

COAST.—The coast of the south-eastern part of Simalur consists of low land with tall trees, except off mount Sibahu, whose slopes come down to the coast.

Sinabang peak, 881 feet above high water, to the southward of the bay of that name, has a saddleback summit rendered very remarkable by having a small cone in the saddle. Lat. 2° 26½′ N. Long. 96° 24½′ E.

From the east point of Sinabang bay the coast trends to the south-eastward.

The shore reef off this point extends to a distance of nearly a mile, near its extremity, being two rocks above water; from thence it gradually decreases in breadth, until it disappears at a short distance north of tanjong Lataling. On its outer edge are many rocks showing a short distance above the water, and near the shore is pulo Biawak, a small wooded islet.

At a distance of about 1½ miles from this part of the coast is pulo Medanga, a coral island having a small fringing reef on which are some rocks above water: there are some cocoa-nut trees on the north-west side, and it is conspicuous owing to its white coral beach.

Between tanjong Anao, which lies over a mile to the south-eastward of tanjong Lataling and tanjong Pulo, is Panarusan bay, which, being full of rocks, is impracticable for vessels.

To the northward of this bay, behind a narrow strip of low land, is a hilly ridge overgrown with tall trees; a conical-shaped clump of trees, which can be distinctly seen from all directions, forming the highest point at an elevation of 876 feet above high water.

Anchorage.—Off Lataling village, 2½ miles south-eastward of pulo Biawak, anchorage can be obtained in a more moderate depth than is usually found on this coast.

Tanjong Pulo is the east point of pulo Panarusan, and on the extremity of the reef which runs off this well-defined point is Batu Belayar, Lat. 2° 25½′ N. Long. 96° 31½′ E.

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Chart, 2,201 [2,536]. No variation.

a remarkable rock of dark stone, 47 feet above high water, which has the appearance of a native praam; another rock lies between Batu Belayar and tanjong Pulo, but it is not so high.

Anchorage.—About half a mile southward of Batu Belayar fairly good anchorage may be obtained in 10 fathoms water, over sand.

Plan, 2,201 [2,536]. Lat. 2° 25′ N. Long. 96° 31′ E.

LABUAN-BAJAU BAY.—To the southward of tanjong Pulo, and between it and tanjong Lentang, is Labuan-bajau bay, in the north-west part of which is the entrance to the Anao channel, which separates pulo Panarusan from the main island; it is full of rocks, and only navigable for vessels of light draught. In the eastern part of the bay is a cove, named Telok Dalam, in which is situated Kota Tingi village.

This bay is clear of danger except for the shore reef, which on the north and south sides extends for some distance.

Anchorage.—There is tolerably good anchorage in 15 fathoms water, over muddy bottom, with tanjong Lentang bearing about S. ½ E. distant 1½ miles; also good anchorage in Telok Dalam, in a depth of about 15 fathoms, off Kota Tingi village.

Lat. 20° 22½′ N. Long. 96° 30½′ E.

TANJONG LENTANG is low and very noticeable, especially from the southward; the shore reef between it and tanjong Latiun extends for a distance of one mile to 1¼ miles from the shore, and can easily be seen by the discolouration of the water.

As the soundings are very irregular, this part of the coast should be given a berth of at least 1½ miles.

Tanjong Bajan is the most southerly point of the island; off it a reef extends for about half a mile. Tanjong Tubah is 4½ miles west-north-west of tanjong Bajan, and this part of the coast to tanjong Lentang is uninhabited, and there are no streams of water.

Dangers.—A reef the existence of which is doubtful is charted, S. by E. ½ E., about 3 miles from tanjong Bajan.

Ujong Tubah reef, which breaks, lies about 2 miles off the coast between tanjong Bayan and tanjong Tubah, and a reef (doubtful) is charted about 3 miles S.W. ½ S. of the latter point.

Coast.—From tanjong Tubah to tanjong Kakat, a distance of about 6 miles, the coast trends in a west-north-west direction; there are breakers all along this part of the coast, but as the shore reef has but little breadth, they may safely be approached to a distance of about a mile.

Plan, 2,284 [2,535]. Lat. 2° 24¾′ N. Long. 86° 17¾′ E.

Tapak bay lies between tanjong Kakat, a well defined rocky point, and tanjong Lasingalu, which is low and situated about 7 miles to the north-westward of it. The shore reef in places, especially on the north side of the bay, extends to some distance.

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Chart, 2,201 [2,536].
Lat. 2° 23′ N.
Long. 96° 14′ E.
No variation.

Islands.—Off the bay lie pulo Tapak and pulo Minchau, and to the southward of tanjong Lasingalu is Siavelak islet.

Pulo Tapak is a hilly island surrounded by a narrow reef; the rocky north point of the island can easily be made out from a considerable distance.

Pulo Minchau is smaller and lower than pulo Tapak; on the western side is a large reef, extending 2 miles from it. To the N.E. and S.W. of the island is a small islet covered with vegetation.

There is a clear passage between Tapak and Minchau islands, the least water being 6 fathoms.

Siavelak is wooded and encircled by a reef that extends a quarter of a mile from the islet. There is a passage between it and tanjong Lasingalu, with a minimum depth of 8 fathoms; this passage is not however to be recommended.

Dangers.—In the bay are four isolated reefs, with less than 3 fathoms of water over them. Centario reef, the largest, with 2 fathoms least water over it, is half a mile in length, and lies to the north-eastward of the north point of Tapak island, distant about a mile; like the other reefs it can at times be distinguished by breakers, or by the discolouration of the water.

The north points of pulo Tapak and pulo Minchau in line, bearing W. by S., clear the south side of this reef, and pulo Minchau will open to the north of pulo Tapak, S.W. by W. $\frac{1}{8}$ W., the north side.

The other reefs are situated from the north point of pulo Tapak, N.W. $\frac{1}{8}$ N. $1\frac{3}{4}$ miles, N. by E. $1\frac{3}{4}$ and $2\frac{1}{4}$ miles; breakers were also about half a mile westward of the former reef.

A reef, with a depth of $3\frac{1}{4}$ fathoms over it, lies with the north point of Siavelak island bearing W. $\frac{1}{2}$ S., and the east point of pulo Tapak S. by E. $\frac{1}{8}$ E. On the southern, eastern and northern sides there is a depth of 10 fathoms; the western side shows discoloured water.

Amelia reef, southward of tanjong Sidowo, extends about 5 cables from the shore and always breaks inside the 5-fathoms contour line.

Anchorage.—There is good anchorage in from 8 to 10 fathoms water, over mud, off Lessikin, which is the principal village in the bay, with the mouth of Lessikin river bearing about S.E. by E. $\frac{3}{8}$ E. and tanjong Sidowo S. by E. $\frac{1}{8}$ E.

Coast.—Tanjong Lasingalu is low and the village of the same name is near it, with a river to the eastward; from it the coast trends in a north-west direction for 9 miles to tanjong Mattan-Tohtoh on the east side

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Chart, 2,201 [2,536]. No variation.

of Lauheh bay, in which is anchorage in 8 fathoms water, over sandy bottom.

Off this part of the coast the reef extends for some distance, especially off tanjong Lauheh.

A reef, with less than 3 fathoms water over it, lies off this bay, and apparently always breaks.

Deh reef with less than 3 fathoms water, is situated S. by E. ½ E., distant 4 miles from tanjong Lauheh; it apparently always breaks.

Plan, 2,234 [2,535]. Lat. 2° 33½′ N. Long. 96° 1′ E.

Laureu-eu bay (Laru u bay).—The east point of this bay is tanjong Lambajo, a low conspicuous point, lying about 3 miles to the westward of Lauheh bay; off this point a reef extends for over 3 cables.

With the exception of a reef with less than 2 fathoms water over it, lying about 7 cables to the southward of tanjong Laureu-eu, the western point of the bay, and of the shore reef which only extends a short distance from the coast, the bay is clear of dangers.

Anchorage.—In the middle of the bay there is very good anchorage in from 6 to 10 fathoms water, over mud or sand, about 7 cables eastward of tanjong Laureu-eu.

Reefs.—A reef lies S. by E. distant 3½ miles from tanjong Lambajo; it sometimes breaks, and the fishermen say that there is a patch with a depth of 2 fathoms over it.

At a distance of 1½ miles S.W. ½ S. of the same point is another reef on which not less than 5 fathoms has been found, it breaks at times.

Simalur Chut is a hilly island over 2 miles in length, lying to the south-westward of Laureu-eu bay. It is encircled by a reef which, except off the eastern and western extreme of the island, is of but little extent.

Anchorage.—There is good anchorage off the village on the north-east side of the island in 7 to 12 fathoms water; with the north point bearing W. by N. ⅞ N. and the east point S.E. ⅜ E. there is a depth of 8½ fathoms.

Breakers were observed on the bearing S.W., distant 3 miles from the west point of the island and N.W. ¾ W. at a distance of about 1½ miles from the same point.

Chart, 2,201 [2,536]. Lat. 2° 34′ N. Long. 95° 58¼′ E.

COAST.—The coast from tanjong Raban, situated about 1½ miles to the westward of tanjong Laureu-eu, trends in a north-west direction for about 3 miles to tanjong Labongan, and then recedes, forming Lingam bay; between these points the coast reef extends in places nearly half a mile.

About a mile north-westward of tanjong Raban, there is a small bay, with 4 fathoms water, over sand, in its centre, where praams find shelter, and on a hill is Simalur village; landing is easy on this part of the coast.

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Anchorage may be obtained off this bay in 9 fathoms water, over sand. Chart, 2,201 [2,536]. No variation.

Lingam bay, between tanjong Labongan and tanjong Usuj, is fairly deep; two small rivers empty themselves into the bay, which is uninhabited.

Tanjong Usuj, the western point of Lingam bay, is low, but is noticeable on account of a remarkable tree standing in its immediate neighbourhood. The shore reef near this point extends nearly half a mile to the eastward. Lat. 2° 37′ N. Long. 95° 51¾′ E.

Pulo Lingam, situated off the bay, is surrounded by a reef, which has a great extent, especially on the north side, where it partially dries, and is distinctly marked by discoloured water. On the east side the island is "steep to," and it is advisable to keep close to that side when making the bay from the eastward, in order to avoid the reef that extends from the adjacent shore of the bay.

Dangers.—Breakers and discoloured water were observed about half a mile S.S.E. from the south point of pulo Lingam, and there is a shoal, with 5½ fathoms water over it, about 2 miles S.W. by W. ¼ W. of the same point.

Anchorage may be obtained in 8 fathoms water, over mud, about one mile north-eastward of pulo Lingam.

Tanjong Aloajan, the south-west extreme of Simalur, is a remarkable precipitous point; the reef off it extends about 2 cables.

Between it and tanjong Usuj is a fairly deep bay, in the entrance of which breakers were seen.

Anchorage near it can be obtained off tanjong Aloajan, in from 14 to 17 fathoms water, over sand.

Rindu (Sawang) reef lies nearly 3 miles to the southward of tanjong Aloajan and is over 2 miles in length in an east and west direction; in rough weather it breaks over its whole extent, whilst parts of it apparently break even in fine weather.

Discoloured water is reported about 2½ miles W. by S ½ S. of tanjong Aloajan.

Lakuan bay.—The coast from tanjong Aloajan trends in a general north-north westerly direction for about 6½ miles, and between are two conspicuous hills named Ujung and Lakuan; it then turns to the westward as far as tanjong Tubah, forming the north side of Lakuan bay, the south side being formed by the island of that name.

In the eastern part of the bay, inside the 5-fathoms contour line, is a shoal, on which there is only a few feet of water. Lat. 2° 42½′ N. Long. 95° 46′ E.

Pulo Lakuan is nearly 3 miles in length, in an easterly and westerly direction A reef extends about half a mile off the western end, and on the north side shoal water extends in places, especially near the eastern

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Chart, 2,201 [2,536]. No variation.

end to a considerable distance from the shore; there is a village on the north side of this island.

Anchorage.—Good anchorage may be obtained in the bay in 10 fathoms water, over sand.

Benkulen bay is small, almost land-locked, and situated on the northern side of Lakuan bay; the reefs on either side of the entrance leave only a narrow fairway, in which the least depth is 3 fathoms.

There are depths of from 2 to 2½ fathoms, over mud, off the village, and this is a safe place for small craft to lie, but it is recommended to mark the reefs with boats before entering.

Lat. 2° 46′ N. Long. 95° 43½′ E.

Tanjong Melabah is the west point of Simalur island; between it and tanjong Tubah surf extends to some distance from the coast.

Bajan reef, which has depths of from 8 to 10 fathoms over it and shows discoloured water, lies about 2½ miles westward of tanjong Melabah.

A patch on which the depth is 7 fathoms is charted N.W. by W. ½ W., distant 4½ miles from tanjong Melabah.

Si Ambong-Ambong rocks lying to the northward of tanjong Melabah, at a distance of about three-quarters of a mile from the coast, are apparently three rocks above water, which can be distinguished from a good distance.

Coast.—The coast from tanjong Melabah trends in a north-north-easterly direction for 2¼ miles to tanjong Loban, when it curves to the north-eastward and eastward, receding and forming the deep bay of Simalandan.

Simalandan bay, about 1½ miles wide, extends in about 2 miles and has deep water; there is little shore reef except on the north side, where it extends about 1½ cables. There are several islands in its inner part, the largest being named pulo Panjang; the channel southward of this island is said to be navigable, but that northward and north-eastward of the island contains reefs; in the inner bay the bottom is rocky.

Lat. 2° 49¾′ N. Long. 95° 46′ E.

Tanjong Araman, the south entrance point, is covered with large trees and easily distinguished; a reef about 2 cables in breadth and "steep-to" extends of this point, and eastward of the point is the mouth of a small river named Silolo. Between the point and the river are three square-shaped rocks eastward of which a sandy beach commences.

Langi village, with some small houses and about 200 inhabitants, has a reef extending about 3 cables off it; to the northward of this is a detached coral reef with a least depth of 2½ fathoms on it.

Simalandan reef, with 2½ fathoms least water over it, lies to the northward of tanjong Langi, with a channel 2 cables in breadth between it and the shore reef.

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Anchorage may be obtained in 10 fathoms water off Langi village, with some shelter during the south-west monsoon. Chart, 2,201 [2,536]. No variation.

Islets.—Reef.— To the northward of Simalandan bay, lying off the coast, are three islets named Alahulu, Tapir, and Penju, completely overgrown with vegetation. To the westward and northward of the last named the bottom is rocky, and soundings of 5 fathoms and under are met with for a distance of more than 2 miles. It appears not improbable that this reef extends as far as the shore; it is therefore inadvisable to pass either within or between these islets until the neighbourhood has been accurately surveyed.

PULO SA LAUT are two islands, overgrown with tall trees, lying about 20 miles, W. ¾ N. from tanjong Liwa; they may be seen from a distance of 13 miles. Sa Laut Besar, the larger island, is about 2 miles in length in an east-north-east and west-south west direction, and 1½ miles in breadth; Sa Laut Kechil, the smaller island, is about half a mile in diameter, and situated 1½ miles northward of Sa Laut Besar.* Lat. 2° 59′ N. Long. 95° 23½′ E.

Dangers. — Southward of Sa Laut Besar, breakers were seen extending for a distance of a mile from the island; from the north-east side of Sa Laut Kechil a reef extends for a distance of 4½ cables, and on the south side there is also a reef extending from the island, showing discoloured water for about the same distance.

Anchorage may be obtained, in 8 fathoms water, south-eastward of Sa Laut Kechil.

PULO TAKAP OR FLAT ISLANDS lie 14 miles south-eastward of pulo Simalur, the northern island being named Babi and the southern Rusian; they are bold to approach, the northern sides, beyond the distance of a cable, having no dangers. Between them, to within 4 miles of pulo Simalur, there is a passage with no known danger in it. Chart, 2,760 [2,534]. Lat. 2° 10′ N. Long. 96° 40′ E.

Suffolk reef, composed of coral, with from 4 to 5 fathoms water over it, and seen by a vessel of that name, is situated with the north point of Babi island bearing W. by S. ⅛ S., distant 4 miles, and the east point of Rusian island S. by W. ¾ W.; it is possible that there are patches, with less depth, between it and Babi island.

The BANJAK ISLANDS are described at page 303.

PULO NIAS, the largest of the islands off the west coast of Sumatra, is 68 miles in length in a north-west and south-east direction, and from 18 to 27 miles in breadth, separated from the Banjak islands by pulo Nias north channel, 28 miles in breadth. It consists of ranges of hills, Gunong Mojeia, the highest summit, being about 1,300 feet above Lat. 1° 24′ N. Long 97° 23′ E.

General chart, 2,760 [2,534].

* These islands were known as the Cocos islands, but the native name Sa Laut has been adopted.

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Chart, 2,760 [2,534]. No variation.

high water; the soil is fertile. It is subject to earthquakes, one of which (1843) swallowed up a hill and a village.

The coasts are either rocky or have sandy beaches, with cocoa-nut palms everywhere, and the island produces some very fine timber of various kinds. Coal is found in places.

The island is thickly populated by an agricultural people who raise rice, cotton, sago, maize, cocoa-nuts, and other useful products. They are estimated at 250,000.

The Malays, though small in number, are the dominant race; they live on the shores, Gunung Sitoli, on the north-eastern side, being the chief town of the island.

NORTH COAST.—Tanjong Lojang, the north point of pulo Nias, is low and thickly wooded, and 4½ miles southward of it the Mojeia river, probably the largest in the island, flows into the sea; the north coast of pulo Nias has a low foreshore.

Lat. 2° 40½′ N. Long. 97° 25½′ E.

Pulo Babi or Sarangbau lies 10 miles north-north-eastward of tanjong Lojang and has a coast reef extending about a mile north-west, and 3 cables from its south point.

Reef.—A reef, which breaks, lies N.E. ¾ N. distant 5 miles from the island.

Lapau bay, a large bight in the north coast, lies between tanjong Lojang on the eastward, and tanjong Tanah Nasie on the west, and contains several islets and reefs; of the former, pulo Panjang is the largest and farthest off shore, and on the coast reef extending from its west extreme there is a rock above water, with shrubs growing on it. A reef, which breaks, lies about 3 cables off the east and north-east sides of pulo Panjang.

About one mile westward of pulo Panjang is Gosong Ombang or Mas, an island surrounded by a coral reef which breaks.

Pulo Bangkora and pulo Lapau are situated about one mile and 2 miles respectively, south-westward of pulo Panjang, and between the two first-named islands there is a coral reef, with 2¾ fathoms water over it, from which the west point of pulo Bangkora bears N.N.E. ⅛ E. and the east point of pulo Lapau S. ⅛ E.

Anchorage.—A village is situated on the south-east part of pulo Lapau, and the inhabitants do some trade with Gunung Sitoli. Secure anchorage may be obtained off the village in 26 fathoms water, over blue clay, with the east point of the island bearing N. by E. ½ E., or anchorage may be taken closer to the island, in depths of 15 to 17 fathoms, over sand and mud.

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Coast.—Tanjong Lebang is about 5 miles south-westward of tanjong Tanah Nasie, and from it the coast trends to the southward for about the same distance to Labuan Acheh; at 12 miles southward of tanjong Lebang are two islands named pulo Bunga. Chart, 2,760 [2,534]. Lat. 1° 23′ N. Long. 97° 4½′ E No variation.

Dangers. — A reef, 3 cables in length in a north-north-west and south-south-east direction and about half a cable in breadth, which has one fathom least water over it and breaks, lies N.N.W., distant 1½ miles, from tanjong Tanah Nasie.

Pulo Musei lies in the bight south-eastward of Labuan Acheh, and a reef, with 7 fathoms water over it, is situated S. by W. ¾ W., distant 3 miles from the island. Between pulo Musei and pulo Bunga there are several reefs.

Merapi reef, with a depth of 6 fathoms over it and showing discoloured water, is about a mile in extent and lies with the west point of pulo Bunga bearing N.W. by W. ⅛ W., distant about 11½ miles.

Aztec reef, with 2½ fathoms least water over it, lies 29 miles westward of the northern island of the Naku group. Breakers are charted about 20 miles south-eastward of Aztec rock. Lat. 0° 55′ N. Long. 96° 48½′ E.

Naku islands is a group to the westward of pulo Nias of which Naku (Nako) island is the principal; it is covered with palmyra trees, has a trade in copra, and the village is on its south-east side. Plan, 2,284 [2,535].

The channel between Naku and Mangit should not be taken by large vessels as reefs and rocks above water lie to the northward of the latter island, and between Mangit and Bindala the channel is altogether blocked.

A reef lies about half a mile eastward of Simanang, and between it and Naku there are some patches. The channel between Sendrongan and Mangit is the most suitable.

Anchorage may be obtained on the south-east side of Naku island in from 19 to 20 fathoms water, with the west point of Langu island bearing N.E. ⅛ N. and the north point of Mangit island E. ½ S. Lat. 0° 50½′ N. Long. 97° 21′ E.

Ujong Serombu is situated 4 miles, N. by E. ¾ E., from Langu, the north-eastern of the Naku group, and south-eastward of the point are two islands named pulo Siite and pulo Lawanda. On the north-east side of the former island there is a village, and at its west point a conspicuous tree; the latter is a sandbank thickly wooded. The Bobbah river runs into the sea on the north-east side of the bay, northward of the islands; its bar sometimes breaks. Chart 2,760 [2,534]. Lat. 0° 57′ N. Long. 7° .0′

Anchorage may be obtained between pulo Siite and the river mouth, in 8 fathoms water, over mud, with ujong Serombu bearing W. by S. ¼ S. and the north point of pulo Siite S. E. ⅛ E. There are depths of

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Chart, 2,760 [2,534]. No variation.

7 to 10 fathoms between the islands and from 8 to 9 fathoms between pulo Siita and ujong Seromba.

Penang reef lies E. by S. $\frac{5}{8}$ S., distant $1\frac{1}{2}$ miles from Sendrongan, the southern island of the Naku group.

Lat. 0° 39½′ N. Long. 97° 29′ E.

Hertog Bernard reef, which dries at low water, lies S.E. $\frac{3}{4}$ S., distant 10 miles from Sendrongan island and 7 miles from the coast of Nias.

SOUTH COAST.—At the south end of pulo Nias there are three bays named Telok Luagundi, Pohili, and Dalam. Depths of from 6 to 7 fathoms are reported at from one mile to 2 miles from the shore, between Telok Luagundi and Telok Dalam.

Plan, 2,284 [2,535]. Lat. 0° 34½′ N. Long. 97° 44′ E.

Telok Luagundi is about $1\frac{1}{2}$ miles deep, but being open to southerly and south-westerly winds, is not a good anchorage; the depths are from $5\frac{1}{2}$ to 9 fathoms. Two small rivers run into the head of the bay and afford good water; there are three villages here. The bay may be recognised by its white sandy beach, and the east point which is covered with cocoanut palms has off it a large black rock named Batu Burung.

Anchorage.—The best anchorage, with south-westerly winds, is in 6 or 7 fathoms water, over stiff clay, with Batu Burung, bearing S. by E. $\frac{1}{8}$ E. and the west point of the bay S.W. $\frac{1}{8}$ S.

Chart 2,760 [2,534].

Telok Pohili affords anchorage in $5\frac{1}{2}$ fathoms water between the west point of the bay and the west point of Nuja, a low wooded island.

Plan, 2,284 [2,535]. Lat. 0° 33½′ N. Long. 97° 50′ E.

Telok Dalam, at the south-east point of pulo Nias, is about 7 cables in extent with depths of from 8 to 17 fathoms; the coast and hills are covered with palmyra trees, but the north-east part of the bay is flat and marshy. Babalobelano village is situated within the north-west side of the bay.

Anchorage may be obtained in 12 fathoms water, with the south point bearing S. by E. $\frac{3}{4}$ E. and the east point E. $\frac{3}{4}$ N.

Water may be procured in a small bay at its head.

Thornhill bank, the least known depth on which is 18 fathoms, and "steep-to," lies about 8 miles southward of pulo Nias, with the hill near Somo Somo, bearing about N.W. $\frac{1}{2}$ W., and distant 15 miles.

EAST COAST.—The east coast of pulo Nias has moderate depths, with good anchorage, and some rivers, where trade is carried on in native craft; islets and reefs front the coast here, as on the western side; but the sea being smoother on the eastern coast renders it safer.

Lat. 0° 40½′ N. Long. 97° 57¼′ E.

Majinga point is thickly wooded and has palmyra trees on the higher ground, the coast between it and Batu point being fringed with a coast reef.

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Dangers.—A reef, with a least depth of 5 fathoms over it, lies 2 miles N.E. by E. $\frac{3}{4}$ E. from the northern entrance point to Telok Dalam, and is about $2\frac{1}{2}$ cables long in an east-north-east and west-south-west direction, and $1\frac{3}{4}$ cables wide. Chart, 2,750 [2,534]. No variation.

Valk, a shoal, with 7 fathoms water over it, which breaks occasionally, lies with Majinga point bearing N.N.W. $\frac{3}{4}$ W., distant $2\frac{1}{2}$ miles.

Argo reef, which was seen breaking, was reported to lie N.E. by E. $\frac{3}{4}$ E., distant about 6 miles from Majinga point, but this position is doubtful. Lat. 0° 44′ N. Long. 98° 3′ E.

Coast.—Between Majinga and Sumbawa points the coast is high, especially at Baleika point, 4 miles northward of Majinga point, off which a reef fringes it, extending for a distance of about 5 cables.

Sumbawa point is low, and between it and Chuanie point, 7 miles to the northward, a broad bank of mud, on which the depths are $2\frac{1}{2}$ fathoms, extends off the coast; pulo Sumbawa lies $3\frac{1}{2}$ miles west-south-westward of Chuanie point.

Macassar reefs include a reef lying $4\frac{7}{10}$ miles eastward of Sumbawa point; a reef one mile southward, and another 2 miles south-eastward, of pulo Sumbawa; they are distinguished by breakers.

Gunung Lembu, about 6 miles north-north-westward of Chuanie point, is low and has a reef extending one mile north-north-east of it.

Sama Sama islands lie $1\frac{7}{10}$ miles off shore between Chuanie point and Gunung Lembu, and between them and the coast is a shoal lying 7 cables off the shore and a rock, W. by S. $\frac{3}{4}$ S., one mile from the western island.

A reef, which shows discoloured water and breaks, lies N.E. $\frac{1}{2}$ N., distant one mile from the eastern island.

Gunung Lembu islands consist of Gunung Lembu Gadang and Gunung Lembu kechil, the former $1\frac{2}{10}$ northward, and latter 2 miles north-eastward, of Gunung Lembu. Lat. 1° 3′ N. Long. 97° 56′ E.

Between the islands there is a clear channel, but a reef extends $2\frac{1}{2}$ miles north-westward of Gunung Lembu Gadang, and between it and the shore there are other reefs.

Senduta reef, north-west of the preceding, has 3 feet water over it, and lies with tanjong Lembaru bearing N.W., distant about $2\frac{1}{2}$ miles.

A pinnacle rock, with a depth of 8 feet over it, is situated 3 miles, S.E. $\frac{1}{2}$ E., from tanjong Lembaru; it lies on a bed of hard sand, 50 yards long, in a N. by E. and S. by W. direction, with 3 fathoms water over it.

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Chart, 2,760 [2,534]. No variation.

Anchorage.—Northward Gunung Lembu there is safe anchorage over blue clay and good holding ground, with tanjong Lembaru bearing N.W. $\frac{1}{8}$ N. and Gunung Lembu Gadang N.E. $\frac{1}{2}$ N.

Lat. 1° 18′ N. Long. 97° 36½′ E.

GUNUNG SITOLI, the chief town of the island, is situated 24 miles north-westward of Gunung Lembu islands and is the seat of Government, which is represented by a controller who is also harbour master. The town is clean and well kept; there is a military garrison and a mission.

Communication.—The Netherlands Royal Packet Company's steamers, running between Padang, Penang and Singapore, call every four weeks.

Supplies are only obtainable in small quantities.

Anchorage.—Labuan Angin, the north point of the bay, is rocky, but near the river and the southern part of the bay there is a beach. Anchorage may be obtained in 32 fathoms water, over clay, with Labuan Angin bearing about N.N.W.; on the north side of the bay there is a depth of 15 fathoms at one cable from the shore.

Tides.—The tides are inconsiderable. It is high water, full and change, at about 6 hours; springs rise about 2 feet.

Coast.—Tanjong Sobu is 9 miles north-north-westward of Gunung Sitoli, and 5½ miles beyond, in the same direction, is tanjong Laja; between these points there is a reef which lies with Sobu point S.E. by S. and Gunong Mojeia S.W. $\frac{3}{4}$ W.

Telok Papola, about 2 miles north-westward of tanjong Laaj, affords good anchorage in 15 fathoms water.

Plan, 2,284 [2,535]. Lat. 1° 30½′ N. Long. 97° 24′ E.

Siaba bay, the northern anchorage on the east coast, affords anchorage in 20 fathoms water, one cable from the shore, with Siaba point bearing N.W. $\frac{3}{4}$ N. distant 2 cables. Nearly 2 cables eastward of the anchorage there is a reef with 3 feet water over it, which sometimes breaks.

Chart, 2,760 [2,534].

Pulo Nias Great channel, between pulo Nias and the Batu islands, is about 37 miles across and safe, with a good look-out, but caution is necessary when near any of the islands during the night, as the dangers are but imperfectly known.

BATU ISLANDS.—The Batu islands are but little frequented, but a trade in dammer (gum), camphor, copra and dried fish, with forest products, is carried on by coasters from Padang.

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Pulo Simu, 37 miles, S. ½ E., of Telok Dalam, is a small, low, triangular-shaped island, about 1½ miles in length in an east and west direction and surrounded by a coral reef; it has large trees on it, and may be seen from distances of from 14 to 16 miles. A detached reef, with from 2 to 3 fathoms over it, which breaks, lies about 2 miles south-westward of the west extreme. The other sides of the island are apparently clear of danger beyond a short distance. Chart, 2,760 [2,534]. Lat. 0° 5′ S. Long. 97° 53′ E. No variation.

Tanah Masa, or Batu island, the central and largest of the Batu group, lies about 40 miles south-eastward of pulo Nias, and forms the south side of pulo Nias Great channel. It is 25 miles in length, north and south, and 5 miles in breadth. This, like the other large islands, is moderately elevated and hilly, covered with trees, and many small islands line its shores both on the east and west sides, with moderate depths among them, and forming safe bays or harbours, but little known to Europeans.

Tanah Masa with its adjacent islands extends north and south nearly 45 miles, fronted by a chain of about twenty isles of various sizes, some of them 13 or 14 miles distant from the main island, with dangerous reefs which are "steep-to."

Reef.—A reef, with depths of from 4 to 6 fathoms over it, is reported to exist to the northward of the island.

Anchorages on east coast.—There is anchorage close off the north shore of Tanah Masa, and also in the bay close westward of Batuwawa point, its bluff north-east extreme, but exposed to the north-westerly monsoon. A few supplies may be obtained here, but no water. Also, on the east coast, about 3 miles south-eastward of Batuwawa point there is anchorage in a depth of 10 fathoms, with good holding ground, close southward of a small islet lying near the shore. There is a watering creek just southward of it. Lat. 0° 1′ N. Long. 98° 20′ E.

Pulo Lago, situated about 3 miles off Batuwawa point, appears to be encircled by reefs which stretch nearly to the shore of Tanah Masa; a small islet on the reef lies south-south-westward, distant one mile from pulo Lago.

Lance or Lams bay lies about 7½ miles south-eastward of Batuwawa point, and is formed by two islands near the shore; a reef extends about one-third of a mile off the northern islet. The anchorage here is in about 16 fathoms water, over sand and shells, nearly midway between the islets, with the north extreme of the outer islet about S.E. ¾ S. A few supplies may be gathered here.

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Chart, 2,760 [2,534]. No variation.

These anchorages on the east side are probably only suitable for small craft, but the least depth reported is 7 fathoms, avoiding patches, and the best track appears to be about half a mile distant from Tanah Masa.

Plan, 2,284 [2,534]. Lat. 0° 3′ S. Long. 98° 16¾′ E.

West coast.—Tello.—About 1½ miles south-westward of the north-west extreme of Tanah Masa is Tello island, with anchorage in from 8 to 12 fathoms, open to northerly winds, at about a quarter of a mile off shore, with the Controller's house flagstaff at Tello village bearing W. by S. ⅔ S. *See* the dangers on plan.

Dangers.—A small reef breaking was seen (1901) about 3 miles south-south-eastward, and a rock above water about 8½ miles in the same direction from the south point of Tello.

Chart 2,760 [2,534].

Pulo Pinie lies 9 miles north-eastward of the north end of Tanah Masa, nearly midway between it and the Sumatra coast; it is of considerable extent, stretching nearly 20 miles east and west, with a breadth of about 5 miles, and having islets and shoals extending off in nearly all directions for a distance of 7 or 8 miles. Kapo village, with a few inhabitants, is on the south-east side of the island; landing is generally difficult round the whole island on account of mangrove bushes.

Lat. 0° 17′ N. Long. 98° 41½′ E.

Dangers north of pulo Pinie.—Laut reef, with 2½ fathoms least water over it, lies with Batu Belobang, the west point of pulo Pinie, bearing S.W. ⅞ W. and the east point of the island S.E. ¼ S.; it is 5½ miles from the island, and not showing by discoloured water is difficult to make out.

Liat Batu reef, of coral and rock, with 1½ fathoms least water over it, is 4½ miles south-eastward of Laut reef and 3½ miles from the island, with the east point bearing S.S.E. ⅜ E.; a small reef, with a depth of 5 fathoms over it, lies a mile southward of Liat Batu.

Ujong Rapa-Rapa, on which the depth is 4½ fathoms, lies 2½ miles from the island with Batu Belobang bearing S.W. by S.; it only breaks slightly and does not show discoloured water.

Rocks with 4 fathoms water over them lie E. ⅝ S. distant 3 9/10 miles, and N.E. ⅛ N. 3 miles from Ujong Rapa-Rapa.

Lat. 0° 15½′ N. Long. 98° 31′ E.

The outer danger, to the north-westward of the island, is a reef about 5 cables in extent, with 4½ fathoms water over it, and surrounded by depths of from 23 to 27 fathoms, it lies 5½ miles from the island with Batu Belobang bearing S. ⅛ W.

From Batu Belobang to Batu Batu, 8 miles to the eastward, a coast reef extends from 3 to 4 miles, and between this and the outer danger above mentioned there are three reefs with depths of 4 fathoms over them;

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the bearings and distances of Batu Belobang from these reefs are S. by E. $\frac{3}{4}$ E. $3\frac{1}{2}$ miles, S. $\frac{1}{4}$ W. $4\frac{3}{4}$ miles, and S.S.W. $5\frac{1}{2}$ miles. Chart, 2,760 [2,534]. No variation.

Dangers East and South-East.—Ular, a small, high and wooded island, lies about 3 miles eastward of the east point of pulo Pinie, and between these are two reefs. Lat. 0° 5½′ N. Long. 98° 52½′ E.

Ular reef, with 4 fathoms least water over it, lies N. by E. $\frac{2}{3}$ E. distant 3 miles from Ular, and between it and pulo Pinie there are three reefs. Northward of Ular reef there are two others with least depths of 3 and 4 fathoms; the eastern of these, situated N.N.W. $\frac{1}{2}$ W., distant 2 miles from Ular reef, is the northern danger on the east side of pulo Pinie.

Ular bank, a sandbank that dries, lies S.E., distant $3\frac{1}{2}$ miles from Ular reef, and E. $\frac{3}{4}$ N. $3\frac{1}{2}$ miles from Ular.

A reef 7 cables in length in a north-north-east and south-south-west direction is situated north-eastward of Ular bank, and has one fathom water over it, surrounded by depths of 7 and 8 fathoms; from it pulo Sembulaling bears S.S.W. $\frac{7}{8}$ W., distant $3\frac{9}{10}$ miles.

Pulo Sembulaling is low and narrow, and pulo Anso, situated to the southward of it, is merely an overgrown sand patch; both islands lie on a reef, about 3 miles in length in a north and south direction.

Sembulaling reef, on which there is a rock that dries at low water, is surrounded by depths of 14 fathoms and lies N.E. by E. $\frac{3}{4}$ E., distant $2\frac{1}{2}$ miles from pulo Sembulaling; it often breaks.

About $3\frac{1}{2}$ miles eastward of Ular bank, with pulo Anso bearing S.W. $\frac{1}{8}$ W., distant $6\frac{1}{2}$ miles, there is a reef over which the sea breaks. Makasser reef, *see* page 323.

Anso reef, the northern side of which dries, lies S.S.E. $\frac{1}{8}$ E. distant $1\frac{1}{2}$ miles from pulo Anso; a reef lies north-north-east of Anso reef, and $1\frac{1}{2}$ miles eastward of pulo Anso there is a large reef.

Between pulo Sembulaling and pulo Ular there is a small reef with from 2 to 3 fathoms water over it.

Islands and reefs on the South coast.—Karang Ujung Bakau, which has 2 fathoms water over it and breaks, lies southward of the large coast reef off tanjong Besar with a narrow channel, having 13 fathoms water, between; it lies $1\frac{1}{2}$ miles from the coast. Lat. 0° 3½′ N. Long. 98° 45′ E.

From 2 to $3\frac{1}{2}$ miles south-south-westward of Karang Ujung Bakau, lie two reefs named Karang Laut Satu and Karang Laut Dua, which break and have $1\frac{1}{2}$ and 2 fathoms water over them respectively.

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Chart, 2,760 [2,534]. No variation.

Tonga, which dries at low water, lies about a mile north-westward of Karang Laut Satu.

Pulo Masien, 6 miles westward of tanjong Besar, is a low, flat island; it is surrounded by a reef, which extends 7 cables south of it; between the island and pulo Pinie there is a small passage.

Three islands, named Kasi, Pasakie Besar, and Pasakie Kechil, lie to the southward of pulo Masien; Kasi is an overgrown sandbank, with an extensive reef on its north side, and the other two islands are small, low, wooded, and each surrounded by a reef.

A coast reef extends southward of the south-west point of pulo Pinie.

Lat. 0° 3½′ S. Long. 98° 44′ E.

Montrado reef, which breaks, is reported to lie with the east point of pulo Pinie bearing N.E. ½ N. and the west point N.W. ¾ W.

A coral reef, on which a vessel struck in 1885, is reported to be situated with Pasakie Kechil bearing N.N.W. ⅔ W. and Pasakie Besar N. by E. ⅛ E. and nearly in mid-channel between Tanah Masa and pulo Pinie, and as many other dangers may exist in this channel, caution is necessary when navigating it.

Lat. 0° 3½′ S Long. 98° 35′ E.

Treba island, the most easterly of the outlying islands on the east coast of Tanah Masa, lies nearly in mid-channel between Tanah Masa and pulo Pinie and is covered with tall cocoa-nut palms.

Tanah Balah is the southern large islet of the Batu group. It is thickly wooded, attains a height of 656 feet above high water, and forms the north side of Siberut strait.

West point or Hatik, is rocky, thickly wooded, and has a small lump on it which is conspicuous, as is also a hill, 394 feet above high water, situated 4 miles eastward of it.

Between the west and south points of the island there is a bay, having in its centre a rock, 7 feet above high water and distant 8 cables from the shore, and on the east side of the south point there is another bay also having a rock 10 feet above high water in its centre.

Anchorage may be obtained at the entrance of this bay in from 12 to 20 fathoms water, over coral.

Lat. 0° 19½′ S. Long. 98° 13½′ E.

Doubtful reef.—High rollers were observed by the Netherlands India s.s. *Governeur-General Myer* in 1895, westward of Tanah Balah, with the north point of Makoli island bearing N.E. by E. ½ E. distant about 10 miles.

SIBERUT STRAIT, between pulo Bojo and Siberut island, is 22 miles wide, and the passage usually taken by steam vessels running between Acheh and Batavia *viâ* Padang. Sailing vessels have hitherto

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chosen the Seaflower channel, southward of Siberut island, said to be free from danger, but in which there is no anchorage ground. Since the survey of Siberut strait in 1877, and the establishment of a light on pulo Bojo, as well as the safe anchorage afforded in the southern portion of the strait, most vessels will find it to their advantage to use it in preference to any other. Chart, 2,760 [2,534]. No variation.

Tides.—It is high water, full and change, in Siberut strait during the north-west monsoon at 7h. 30m., springs rise 2½ feet.

Tidal Streams.—On the north coast of Siberut, the flood runs E.N.E., at times from 2 to 3 knots, but is sometimes overcome and even reversed by the westerly current which runs at this season. The ebb is increased by this current, and running in a W.S.W. direction has a rate of about 3 knots. On the east coast of Siberut, the flood runs to the southward and the ebb to the northward.

On the east coast of pulo Bojo the ebb sets N.W. turning West and W.S.W. between that island and Tanah Balah.

Winds.—From November to May, when the N.W. monsoon prevails south of the equator, the weather is fine in Siberut strait, with cool westerly winds. During the day the wind is mostly fresh from N.W., shifting towards evening to S.W. and south. Over the coast of Sumatra lightning with squally weather is seen towards night, but it does not extend off to Siberut. On that coast the north-west monsoon is seldom felt northward of Kru (5° S.), but land and sea breezes prevail with fine weather, and sometimes rain at night.

NORTHERN SHORE.—The south coast of Tanah Balah forms the north shore of Siberut strait. West point (Hatik), its western extreme, is rocky, and has a remarkable clump of trees resembling a hillock. With the exception of a rocky point to the eastward the coast is sandy, and no dangers are known to exist other than those above water. In the bay, north-westward of pulo Bojo, there is a rock above water from which a spit extends one cable to the eastward. As this portion of the strait has not been properly surveyed, and the water is generally deep with a heavy swell breaking all along this coast during the north-west monsoon, it is better to keep the Siberut island shore. Lat. 0° 32 S. Long. 98° 17′ E.

PULO BOJO, lying about 1½ miles southward of Tanah Balah, is a small sloping island, 2½ miles in length in a north-north-west and south-south-east direction and 1½ miles in breadth; it is 394 feet above high water, and covered with trees. A reef surrounds it, extending to the distance of from 2 to 3 cables; there are depths of 30 fathoms, over coral, between it and the reef extending 5 cables southward from Tanah Balah.

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Chart, 2,760 [2,534].
Lat. 0° 39′ S.
Long. 98° 32′ E.
No variation.

LIGHT.—On the south-west side of pulo Bojo, an iron, sixteen-sided tower 215 feet in height and painted white, exhibits, at an elevation of 361 feet above high water, a *white group flashing* light, with a period of system of *half a minute* showing a *flash* for *three and a half seconds;* eclipse, *four seconds; flash* for *three and a half seconds;* followed by an eclipse for *nineteen seconds;* it should be visible, in clear weather, from a distance of 27 miles, between the bearings of S. 22° W., through west, to S. 67° E. A stone dwelling is situated near the lighthouse.

Dangers eastward of pulo Bojo.—About 8 miles eastward of the island lies an extensive reef, which has a north-north-west and south-south-east direction for a distance of about 6 miles, the island bearing between West and S.W. from its extremes.

Several coral patches, with depths of from 3 to 7 fathoms over them, lie on this reef, and some shown by breakers; they have depths of from 8 to 14 fathoms between them, and one mile east-south-eastward from the southern extreme there are depths of more than 20 fathoms.

Van Bylandt reef, which is a mile in length in a N.E. by E. and S.W. by W. direction, lies E. by N. ½ N. distant 10 miles from the south point of pulo Bojo, and often breaks with smooth water.

Heavy breakers were reported in 1876 by the steam-vessel *Marion*, on the east side of Tanah Balah, about 5 miles north-eastward of pulo Bojo, but the Dutch surveyors found 117 fathoms near this position, and make no further mention of it.

Southern shore.—The northern end of Siberut island, 15 miles in length in an east and west direction, forms the south side of Siberut strait. Behuden point, the north-western extreme, is a rocky point, from which the coast trends eastward to Bumpyes point, a distance of 3 miles. Bumpyes is a double point with a conspicuous white rock on the western head visible from the northward at the distance of 7 miles; there is also a remarkable tree on it which is only seen from the eastward. With the exception of Bumpyes point the whole shore is sandy. Tanjong Sigeb is thickly wooded.

Lat. 0° 59′ S.
Long. 98° 40′ E.

Dangers.—A bank with general depths of about 20 fathoms extends in a north-north-west direction for a distance of 14 miles from the north end of Siberut and has a breadth of about 12 miles; on the eastern side of this bank is a ridge with general depths of 15 fathoms, over sand and coral, with several shoal patches lying on it. For a distance of about 9 miles from tanjong Sigeb the ridge has only a breadth of about half a mile and narrows in places to a cable, but further northward it is 3 miles in extent; on its eastern side the depths are over 50 and 80 fathoms.

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A reef, on which the depth is 4¾ fathoms, over coral and sand, which only shows discoloured water at times, lies N.W. ⅝ W., distant 2½ miles from the extreme of tanjong Sigeb. Chart, 2,760 [2,534]. No variation.

A reef, a mile in length in an east and west direction, and half a mile in breadth, with 3¾ fathoms least water over it, lies N.W. ½ N., distant 6 miles from tanjong Sigeb, with pulo Sigir open eastward of the point, bearing about S.E. ¼ S.

A reef, nearly 4 cables in extent, and with 5 fathoms water over it, lies N.W. ¾ N., distant 7½ miles from tanjong Sigeb.

A reef, half a mile in diameter with 5½ fathoms water over it, is situated N.W. ¼ N., distant 11 miles from tanjong Sigeb; pulo Sigir is shut in when on this reef.

A reef, about 2 cables in extent, lying N.W. ⅛ N., distant 12½ miles from tanjong Sigeb, has 3½ fathoms least water over it. The northern danger, on the ridge above mentioned, is a reef, about a mile in diameter, with 6 fathoms water over it; from it tanjong Sigeb bears S.E. ¼ S., distant 13 miles.

Macassar reef, of sand coral, with a least depth of about 2 fathoms, is 2 miles in extent, and lies in the centre of the western entrance to Siberut strait, and on the north-west edge of the bank extending from Siberut island. This reef breaks occasionally with the swell, and in strong winds the breakers will be visible from about 4 miles distant. Lat. 0° 48½′ S. Long. 98° 37½′ E.

From the reef, Behuden point bears S. by E. ⅝ E., distant 11 miles, and tanjong Sigeb E. by S. ⅝ S., 18 miles; northward and westward of the reef there is no bottom at 60 fathoms.

Near the north coast of Siberut there are two coral reefs. The eastern, with 5 fathoms water over it, lies 8 cables westward of tanjong Sigeb, and the western, on which the depth is 2 fathoms, 3½ miles eastward of Bumpyes point and a cable off shore.

A shoal, with 4 fathoms water over it, is situated 4½ miles eastward of Bumpyes point, a mile from the shore and near the anchorage.

Anchorages.—The best anchorage on the north coast of Siberut is between Bumpyes point and the point next westward of tanjong Sigeb, where the depth is 8 fathoms about 1¼ miles from the shore, deepening quickly to 12 and 14 fathoms further out; or a berth may be taken up half a mile off the shore in 5 or 6 fathoms water; the bottom is sand. There is also anchorage, over sand, in depths of from 10 to 15 fathoms with the north-east extreme of tanjong Sigeb bearing E.S.E. or S.E. by E.

The coast between tanjong Sigeb and the next point westward of it is steep, and west of the entrance to a river there are from 17 to 20 fathoms at half a mile from the shore.

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Chart, 2,760 [2,534]. No variation.

Directions.—Vessels approaching Siberut strait from the westward should steer to pass about 2 miles southward of the west point of Tanah Balah and will sight pulo Bojo, 394 feet above high water, with its lighthouse, the light from which is visible about 27 miles. The best channel is that between pulo Bojo and Macassar reef, which is apparently clear of all danger, and the reef is nearly always to be seen by the breakers. The island should be passed at the distance of 2 or 3 miles, steering East, until tanjong Sigeb bears S.S.E., when course may be shaped for the desired port.

Or pulo Bojo lighthouse may be brought to bear about N.W. and a S.E. by E. course steered to pass between Macassar reef and the reefs, on the east side of the bank, and then round tanjong Sigeb at the distance of a mile.

Course may also be shaped along the north coast of Siberut island, passing Bumpyes point at a distance of 2 miles and tanjong Sigeb the east point at about one mile; by this means the patches are avoided. In this track, anchorage may be taken anywhere in moderate depths, over sand, whilst northward of Macassar reef there is no anchorage; so that for sailing vessels, possibly meeting with light winds and an adverse tide, the southern track through the strait is recommended.

By night.—From the westward steer for pulo Bojo light bearing East; when past it, bring it to bear W. $\frac{5}{8}$ N. and steer E. $\frac{5}{8}$ S. using it as a stern mark, which will lead 3 miles northward of the reefs on the east side of the bank.

From the eastward steer for the light bearing W. $\frac{5}{8}$ N.

MENTAWI ISLANDS.—Siberut island (Great Fortune island of the Dutch) is 57 miles in length and from 15 to 24 miles in breadth. It is inhabited by a race of Malays named Mentawi. The north and a portion of the east coast of the island has been described on page 378.

Siberut island is high and wooded, with many sandy beaches along the coast, and on which there is usually a heavy surf breaking on the western side.

Several small islands lie close to the coast on the eastern side, others interspersed with shoals lie off the south-west and south sides; the southernmost of the latter, named West island, is 10 miles off shore. There is an intricate channel between the islets off the south-west and south shores, with depths of from 16 to 20 fathoms, but it is inadvisable to attempt it.

Lat. 0° 57½′ S. Long. 98° 57½′ E.

Pulo Sigir, situated 4 miles south-eastward of tanjong Sigeb, is a small, wooded island, surrounded by a sandy beach, and encircled by a coral reef which, east-south-east of the island, dries at low water.

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Dangers.—Two coral reefs, with 4 and 3 fathoms water over them, lie E. by S. $\frac{7}{8}$ S. and S.E. $\frac{1}{8}$ E., distant 8 cables and $1\frac{1}{10}$ miles respectively from pulo Sigir, and southward of this there are several reefs lying more than a mile from the coast. Chart, 2,760 [2,534]. No variation.

Anchorage.—There is anchorage southward of pulo Sigir, which may be approached by keeping close to the reef extending about half a mile south-east of that islet, to avoid shoal patches of 3 and 4 fathoms lying less than one mile south-east of it, and anchoring, with the islet bearing N. by E. $\frac{3}{4}$ E., distant about one mile, in 6 fathoms water, over sand.

TABEKAT BAY, situated on the east coast of Siberut, about 9 miles southward of tanjong Sigeb, lies within pulo Langeirak (Carolina) and pulo Limo (Anna) islands, and affords sheltered anchorage against all winds. It has two entrances: the northern passing westward of pulo Langeirak and between it and the coast, and the southern between pulo Langeirak and pulo Limo; a small channel southward of pulo Limo has a depth of only $1\frac{1}{2}$ fathoms in one portion of it. Plan, 1,701 [2,533].

The coast northward of the bay is thickly wooded with high trees, and off it lie two islands, the outer named pulo Katumbang (Kris) and the inner pulo Umana (Bertha); a reef, "steep-to," which breaks, extends half a mile southward of the latter island.

A reef, with 7 feet water over it, extends $2\frac{1}{2}$ cables in a N. $\frac{7}{8}$ W. direction from the north-west point of pulo Langeirak and is "steep-to," having a depth of 19 fathoms close to; another reef, on which the depths are from one fathom to 4 fathoms, extends, in a south-south-east direction, for nearly 4 cables from the island and is also "steep-to."

Tabekat, 820 feet above high water, is the highest hill on this part of the coast; seen from the eastward and south-eastward it has a sharp summit.

Tabekat river has a drying mud bank about 3 cables in extent fronting its mouth; the channel over the bank has a depth of 3 feet at low water, and in the river there are depths of from 2 to 3 fathoms, but it is only about 11 yards in width near the villages; the inhabitants of the villages are friendly. The banks of the river are thickly overgrown with mangroves and nipa palms. Lat. 1° 4′ S. Long. 98° 58′ E.

Anchorage may be obtained, in 10 fathoms water, about $1\frac{1}{2}$ cables north-westward of pulo Limo with the north-west extreme of pulo Langeirak bearing N. $\frac{1}{8}$ W. and the north extreme of pulo Limo E. $\frac{3}{4}$ S.

Directions.—North entrance.—Steer for Tabekat hill bearing W. $\frac{3}{4}$ N. to pass about 4 cables northward of pulo Langeirak, between the shoals on either side, and when the west side of pulo Langeirak bears about

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Plan 1,701 [2,533]. No variation.

S. by E., alter course to S. by W. $\frac{1}{4}$ W. till the north point of pulo Langeirak bears N.E. by E. $\frac{1}{2}$ E., when a S.E. course leads to the anchorage, south-westward of pulo Langeirak.

South entrance.—Steer for the north side of pulo Limo bearing about W. by N. until the mouth of the river bears N.W. by W. $\frac{2}{3}$ W. which clears the reef southward of pulo Langeirak; the course is then along the north side of pulo Limo to the anchorage.

Chart, 2,760 [2,534].

Silipat river flows into the sea at a point situated 14 miles southward of tanjong Sigeb, the coast between being covered with high trees, with a small sandy beach which is steep, the 5-fathoms contour line being not more than 3 cables from it. There is a depth of about 3 feet at low water over the bar with 6 fathoms, decreasing to 2 fathoms inside.

Anchorage may be obtained, in 15 fathoms water, a mile north-north-eastward of the entrance.

Plan, 2,284 [2,535]. Lat. 1° 23′ S. Long. 99° 6′ E.

SILUGUI BAY lies about 22 miles southward of Tabekat bay. The entrance is 8 cables in width and it has general depths of 18 28 fathoms, but a shoal, with about 2 feet water over it, lies in the northern portion, and a reef, with $1\frac{3}{4}$ fathoms water over it, is situated with the south-east point of Togga Tesebukan bearing S.W. $\frac{1}{8}$ W. and the north point of the bay N. $\frac{1}{3}$ E.; there is also a shoal, with a depth of 3 feet, in the southern part of the bay. Silugui river runs into the western part of the bay.

Anchorage.—There is anchorage north-east of the river mouth in about 20 fathoms water; the coast reef extends off the river for a distance of about 3 cables.

Plan, 866 [2,541]. Lat. 1° 35′ S. Long. 99° 13′ E.

SIMALAPEH AND SIBERUT BAYS are situated about 33 miles southward of Tabekat bay. Northward of the north point of Simalapeh bay there are a group of small islands.

Siberut bay has a village and flagstaff on the south side of the entrance to the river.

Anchorages.—Simalapeh bay affords anchorage in 12 fathoms water, over sand, south-south-west of the north-east point of the long island occupying its northern part, but this anchorage is open to winds between N.E. and S.E.

More secure anchorage may be obtained in 8 fathoms water, over sand, about S. by W. from the south-west point of the same island.

Anchorage in Siberut bay may be taken up in 25 fathoms water, over mud, east-south-eastward of the river mouth.

Chart, 2,760 [2,534]. Lat. 1° 44′ S. Long. 99° 18′ E.

Sebikoket islands lie one mile northward of Katorei point, and south-east of them there is a reef about 3 cables in diameter with a rock awash which breaks; it lies with the northern point of the island bearing N.W. by W. $\frac{1}{8}$ W. distant one mile and Katorei point S.W. $\frac{3}{8}$ W. with 3 to 7 fathoms water between it and the coast.

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KATOREI BAY, situated at the south-east extreme of Siberut island, has an entrance about a mile in width, and stretches in about 5 miles in a north-north-west direction, narrowing inside the entrance to about 3 cables with a depth of 5 fathoms; Selenna island, 4 cables in length, 2 cables in breadth, covered with high trees and surrounded by a small coast reef, is about a mile south-eastward of the entrance. Plan, 2,284 [2,536]. Lat. 1° 47′ S. Long. 99° 18½′ E. No variation.

Katorei point, on the east side of the entrance, is covered with high trees, as is also Lebu island on the western side; the villages are not on the shores of the bay but a little inland.

Dangers.—Extending half a mile south-east of Selenna island there are two reefs, with depths of 3 and 6 feet over them, and reefs in the channel between the island and Katorei point, from which a coast reef stretches out for a distance of 4 cables.

Anchorage may be obtained, almost sheltered from all winds, about a quarter of a mile westward of Selenna island, in from 6 to 7 fathoms water, over good holding ground.

The west side of Siberut is unexplored.

SEAFLOWER CHANNEL, formed between the islands off the south side of Siberut and Sipora, is named after H.M. brig *Seaflower*, Captain W. Owen, who passed through the channel in 1806, and who describes it to be clear of danger; no soundings were obtained at 30 fathoms in passing through. Chart, 2,761 [2,540].

As there is no anchorage ground in this channel, Siberut strait, which has been partly surveyed, is to be preferred.

SIPORA (Sikabu), one of the Mentawi islands, forms the south side of Seaflower channel, and between cape Tilleru the north-east point, and cape Marlborough the south point, is about 27 miles in length, and from 4 to 10 miles in breadth. The island is wooded and a little less elevated than Siberut.

Siburu islands, lying off the north coast, are hilly, and may be seen from a distance of 20 miles; a hill on the north-east side of Sipora is visible 30 miles.

A reef extends half a mile off the north-east end of Sipora, and westward towards Hurlock bay. Westward of the bearing of the east extreme of Setan island, N.W. ½ W., isolated reefs exist.

HURLOCK BAY, consisting of an outer and an inner bay, lies on the north side of Sipora, and directly south of the small islands which front the shore. Plan, 866 [2,541]. Lat. 2° 3′ S. Long. 99° 35′ E.

The outer bay has moderate depth for anchorage, with a soft bottom, but is open to northerly winds. The inner bay is about one mile in diameter, with an entrance about half a mile in width, with depths of 4 to 7 fathoms. In entering the inner bay, the northern side of the channel

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Plan 866 [2,541]. No variation.

should be kept, as a reef extends some distance from the south side of the entrance.

Anchorage.—There is anchorage, sheltered from all winds, in the northern part of the inner bay, in depths of 8 to 10 fathoms, with 3 to 5 fathoms nearer the shore, which is a red sandy beach.

Chart, 2,761 [2,540].

COAST.—The east coast of Sipora is generally steep, but rocks project a considerable way from the shore in some places, particularly to the southward of a round peaked hill named Turks Cap; from abreast of the Cap, soundings may be obtained along the coast towards cape Marlborough, which is bluff, moderately elevated, and fronted by rocks extending 1½ miles off shore.

Settlements.—On the east coast of Sipora are the following streams on which there are settlements, viz., the Sjoreino at 2 miles northward of Siuban; Siuban in the bay of the same name; Sabarau 3 miles farther southward, and the Sikichi, 5 miles southward of Siuban.

Lat. 2° 10′ S. Long. 99° 42¾′ E.

Shoal.—A shoal, with 5 fathoms water over it, lies off the coast in the vicinity of Sabarau.

Supplies.—At these places a vessel may be supplied with wood, water, a few hogs, yams, poultry, and cocoa-nuts, by the people of the few straggling villages on the east side of the island.

Weather.—The weather during July and August, when this coast was visited, was variable, the wind usually south or south-east, varied by northerly winds and heavy north-west squalls, which latter lasted only a few hours. During August the rainfall was heavy.

Plan, 866 [2,541]. Lat. 2° 7′ S. Long. 99° 40′ E.

SIUBAN BAY is about one mile in length and half a mile in width between the wooded entrance points, with depths of 20 to 30 fathoms in a channel, about 3 cables wide, between the reefs extending from those points. The bay may be recognised by the small conical hill just northward of it, and by the white and conspicuous sandy beach known as Pasakiet bay at one mile in the same direction.

Anchorage.—The best anchorage is in the south-east part, with the south point of the entrance bearing about N.E., in depths of from 8 to 14 fathoms.

A good anchorage is in 23 fathoms water, with the south-east point of the bay bearing E. by S. ⅓ S.; the river mouth S.W. by W. ½ W.; and the north-west point N. by W. ⅔ W.

The precaution of sounding around the vessel should be taken, for in some parts there are patches of coral rock. Siuban river is on the western side of the bay, and at about one hour's row up the river is Siuban village.

Tides.—It is high water, full and change, at about 6 hours, springs rise 4 feet. The flood stream sets southward and the ebb northward along the coast.

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SEME-BAAI BAAI, 8½ miles south-east of Siuban bay, may be known by the Turks Cap hill to the southward, and by Seme, a small coral island covered with shrubs and with one or more palmyra trees and surrounded by a coast reef lying in the middle of the entrance. The bay is about one mile wide with depths of 13 to 16 fathoms over the greater portion of it, and the coast reef only extends a short distance off the entrance points. Plan. 866 [2,541] Lat. 2° 14′ S. Long. 99° 45′ E. No variation.

Anchorage.—Southward of the island the bottom is mud, and suitable for anchorage in depths of from 10 to 20 fathoms. A good position, in 15 fathoms water, is with the east point of the bay bearing E. ½ N. and the islet and northern point in line N. by W. ¼ W. The bay is uninhabited.

Cape Marlborough, the south point of Sipora, is steep and has a reef extending 1½ miles from it.

The West coast of Sipora is rocky, with some small islands adjoining, and the sea breaks high upon the shore. Sidua Mata and Noko, two of these islands, about 8 and 20 miles respectively north-westward of cape Marlborough, lie close to the shore, and are low, flat, covered with cocoa-nut trees, and rocky to seaward.

SIPORA STRAIT.—The channel between the south end of Sipora and North Pagi island is about 12 miles in breadth, and considered to be safe. The islands are said to be connected by a coral ridge of from 20 to 40 fathoms; on this ridge, which lies with Turks Cap in line with cape Marlborough, bearing N.W. by N., and at about 3 or 4 miles from Sipora, there is a bank of about 7 fathoms water, which should be avoided as less water may exist. Chart 2,761 [2,540].

The British vessel *Dunleep Singh* (1884) found depths of 22 fathoms, rapidly decreasing to 13 and 7½ fathoms, with the bottom plainly visible, about 4 miles S. ½ E. from cape Marlborough. Lat. 2° 26′ S. Long. 99° 50′ E.

PAGI ISLANDS are together about 55 miles in length, separated by Sikakap strait. Both the islands are high, covered with large trees, and may be seen in clear weather about 40 miles. The inhabitants are said to be simple and inoffensive. Cocoa-nuts and sago palm are cultivated.

North Pagi is about 18 miles in length by 15 miles in breadth.

SIMANGANJU ROAD, situated near the north-east extreme of North Pagi island, is an open anchorage, and in the northern part of the road lies the village abreast an islet, with depths of from 5 to 6 fathoms, over mud, at about a quarter of a mile off the islet. There are some islets northward of the road. Lat. 2° 31′ S. Long. 100° 6′ E.

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Chart, 2,761 [2,540]. No variation.

Anchorage.—Good anchorage may be obtained, in from 14 to 16 fathoms water, over sand and shells, about 7 cables from the coast with the northern mouth of the river bearing S. ¾ W. or closer in.

Plan, 2,761 [2,540]. Lat. 2° 37′ S. Long. 100° 8′ E.

Simanganja road is small and has a reef, with rocks above water, lying northward of its south point; inland there are three small hills. Simanganja island, small and covered with palmyra trees, is on the north-eastern side of the road and the village is about a quarter of a mile westward of the island.

Anchorage may be obtained in the road in from 5 to 6 fathoms water, over mud, about 3 cables eastward of Simanganja island.

About 3 miles southward of Simanganja bay is Simomtobi head.

Plan, 2,761 [2,540]. Lat. 2° 44½ S. Long. 98° 57′ E.

SILABULABU BAY, on the west coast of North Pagi, has a group of islands lying off its entrance, with a channel on either side of pulo Silabu Besar (Montrado), the largest island, which leads to anchorage between it and the coast. The best channel to the anchorage is northward and eastward of pulo Silabu Besar, avoiding the reef extending some distance off it, between the coast reef off it and a detached reef off the north point of the bay. The channel southward of the island, and between it and tanjong Silabu, is not recommended. Pulo Silabu Kechil (Mangkasar) island lies about 3 cables south-eastward of pulo Silabu Besar, and the entrance to the Silabulabu river is half a mile eastward of the former island.

Silabulabu village is situated on the side of the river, where water may be procured.

Batu Mongo bay and village lie southward of Silabulabu bay; from thence to the south-west entrance of Sikakap strait the coast is rocky, upon which the sea breaks heavily.

Anchorage.—The best anchorage is in from 10 to 11 fathoms water, northward of the north point of pulo Silabu Kechil.

Plan, 2,761 [2,540]. Var. 0° 5′ E.

SIKAKAP STRAIT, separating the Pagi islands, is about 7 miles in length in a north-east and south-west direction, and less than half a mile in breadth in its narrowest part, with water sufficient apparently for most vessels, but it has not been properly surveyed.

Lat. 2° 49′ S. Long. 100° 9′ E.

Pulo Ti Nussa, at the south end of the strait, is separated from North Pagi by a channel, with from 5 to 10 feet water, fronting which there is a small island, having a rock upon it resembling a thatched house when viewed from the south-westward. The sea breaks with great violence upon the rock, and upon the low rocky shore to the westward.

The passage from the south-westward is between pulo Ti Nussa and the Siopa islets, by keeping in mid-channel, and thence westward

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of pulo Mashuchu, which is low and wooded, and pulo Bakot Pegu, where the depths are from 5 to 15 fathoms; the northern side of the strait is high, densely wooded, and has tall trees. There is a rock in the channel eastward of pulo Bakot Pegu, and a few others near the shore of South Pagi. Pulo Tongo in the eastern entrance is high and nearly joined by reefs to South Pagi island; the channel, therefore, is northward of pulo Tongo, where the depths are from 17 to 30 fathoms. Plan 2,761 [2,540]. Var. 0° 5′ E.

Pulo Sama, about a mile northward of pulo Tongo, is covered with brushwood, and the bay southward of it is full of rocks. Lat. 2° 43′ S. Long. 100° 14′ E.

Tekakap river, on the western shore, where fresh water may be procured, is opposite the north-west point of South Pagi; the village of that name is several miles up the river; there is also fresh water under the high land at the south-east point of North Pagi.

The trees in Sikakap strait are suitable for spars; they are also cut into planks by the natives for the Padang and Benkulen markets.

Anchorages.—The small bays on either side, with moderate depths of water, afford anchorages out of the strength of the tidal streams.

The Dutch war vessel *Java* anchored to the eastward of pulo Bakot Pegu in 13 fathoms water in the vicinity of Tekakap village on the south coast of North Pagi island; this village is about 2 hours' row up the river, which has 12 feet water at its mouth, and 10 to 18 feet to the village, where there is a depth of 9 feet.

Takeli village is situated on a small river, nearly a mile further eastward, and is about a quarter of an hour's row from the mouth. The inhabitants of both villages went on board the vessel in great numbers and unarmed.

Tidal streams.—The tidal streams run at rates of from $1\frac{1}{2}$ to 2 knots an hour.

SOUTH PAGI or SOUTH NASSAU ISLAND is about 38 miles in length by 10 miles in breadth, with several small islands near the western and south-east sides. The west coast of Pagi islands, in several places where the land is low, abounds with cocoa-nuts; some small spots have been planted with pepper vines.

Labuan Jau road is an open anchorage with depths of 12 to 13 fathoms, over mud, at about 2 cables off shore. Plan, 2,761 [2,540] Lat. 3° 4′ S. Long. 100° 23′ E.

A large reef lies about 3 miles off shore.

VEKENS BAY, on the south-east side of South Pagi, lies within Tinopo island, which fronts its entrance; it is about 6 miles in length by from one mile to 3 miles in breadth, and is the only sheltered anchorage on the east coast of South Pagi. The northern entrance has charted depths Plan, 2,761 [2,540]. Lat. 3° 7′ S. Long. 100° 26′ E.

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Plan, 2,761 [2,540]. Var. 0° 5′ E.

of from 11 to 13 fathoms and is about three-quarters of a mile wide. The southern entrance shows no soundings.

Supplies.—Baturuwi village is situated in a creek, north-westward of Verdam island, and water and some supplies may be obtained.

Anchorages.—There is anchorage, in about 15 fathoms water, at about half a mile off the centre of the west coast of Tinopo island, and towards the head of the bay about 6 cables westward of Neumanu island, in about 10 fathoms, over mud, with the extremes of the island bearing N.E. ½ E. and East. For the dangers in the bay, see the plan.

Chart, 2,761 [2,540].

Reef.—About 2 miles north-eastward of Tinopo island is a large reef.

Anchorage.—Between this bay and the east point of South Pagi, temporary anchorage may be taken off some of the small villages, where the depths appear to be moderate.

Tides.—The tide among the Sipora and Pagi islands rises from 3 to 5 feet at springs; the streams are affected by currents caused by the prevailing wind.

Suman and Mongo islands are situated 2 and 5 miles respectively south-eastward of the south entrance point of Vekens bay; the latter island is high

Lat. 3° 16′ S. Long. 100° 35′ E.

Samuel reef, showing discoloured water, is reported to lie with the south point of South Pagi bearing S.W. by W. ⅓ W., and Mongo island N.W. ⅛ W., distant 1½ miles.

SANDION ISLAND, lying 14 miles south-eastward of South Pagi, is low and encircled by a reef extending for a distance of 2 miles from the shore, except on the west side where it is half a mile broad. A small round island, with trees, lies one mile from the north-east side of Sandion, on the reef which surrounds that island.

Lat. 3° 30′ S. Long. 100° 31′ E.

Europa reef, of coral, lies westward of Sandion. The *Europa* (in 1797), steering E.S.E. to pass southward of Sandion, obtained soundings in 33 fathoms, soon shoaling to 4 fathoms; when the course being altered to S.W. the water deepened in half an hour to 65 fathoms, with no bottom. When in 4 fathoms, the east point of Sandion bore E. by N. about 9 miles distant.

The *David Scott*, in 1825, found 25 fathoms hard bottom, with the centre of Sandion bearing N.N.W. ⅔ W., distant 10 miles; being nearly calm, a boat was sent to sound a distance of 2 or 3 cables from the

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vessel, and found the same depth. As other coral spots may probably exist in the vicinity of Sandion, it seems prudent to give this island a good berth on all sides. The channel between Sandion and South Pagi is reported to be safe. Chart. 2,761 [2,540]. Var. 0° 5′ E.

TRIESTE ISLAND, or Pulo Mega, situated 37 miles south-eastward of Sandion island, is 3 miles in length, surrounded by a reef, and should be visible from a distance of about 15 miles in clear weather. A coral bank with depths of from 25 to 30 fathoms stretches 4 or 5 miles off the north, east, and west sides of the island, on which a sailing vessel may anchor, if drifted near by the current during calm weather. Lat. 4° 0′ S. Long. 101° 1′ E.

Anchorage may be obtained in 12 fathoms water, over sand and coral, about half a mile off the east coast, and there is a good landing place.

Water.—Some fresh water may be procured upon the island in the rainy season.

ENGANO (Telandyang), the southernmost of the large islands fronting the west coast of Sumatra, and distant from it 60 miles, is 19 miles in length and about 10 miles in breadth; it is hilly, and a peak near the middle of the island is about 1,060 feet above high water, and may be seen from a distance of about 22 miles in clear weather. The island is generally wooded with large trees, and along the whole coasts are numbers of cocoa-nut palms. The shore generally is rocky and bold, fronted by ledges on which the sea breaks, rendering landing impossible in many places. Black rock, 8 feet above high water, lies about one mile off Kenemei, the south point.

Engano bay, on the east side of the island, has in its entrance three small islands surrounded by reefs, which always break heavily. Plan, 2,761 [2,540]. Lat. 5° 27¾′ S. Long. 102° 22′ E.

North island (Aduwe) is inhabited, covered with trees, and has a flagstaff on its north-west point: excepting a small opening on the west side, it is surrounded by a coral reef of considerable extent, partly dry at low water, but having depths of 4 to 7 fathoms close-to.

A reef, with 3½ fathoms least water over it, lies about half a mile south westward of North island, and about 4 cables west-north-westward of the reef there is a coral patch on which the depth is 3¼ fathoms.

South island (Kaupanu), distant 1½ miles from North island, is also covered with trees, and surrounded by a reef, which on the western side extends but a short distance. There is a narrow passage apparently between

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General chart, 2,761 [2,540].

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Chart, 2,761 [2,540]. Var. 0° 5′ E.

South island reef and the reef which extends one mile south-eastward of Kowabi point.

Middle island (Kaperuru), the smallest of the three, is conspicuous from the sea, having a high sandy beach, with a tuft of trees on the centre. It is situated on the outer detached reef which lies off the north-east point of the head of the bay, with apparently no passage between; the reef extends about a quarter of a mile eastward of Middle island.

Buoy.—A nun buoy, painted red, is moored about 3 cables north-westward of the north-west point of North island.

Settlement.—The residence of the Dutch magistrate in charge is on North island; Kifajuk village, situated on Engano, abreast North island, is some distance inland.

Communication.—The Netherlands Royal Packet Company's steamers from Batavia to Padang call here once every three months.

Supplies.—At the head of the bay fresh water may be obtained from Okia river. The island abounds with good timber, fish, yams, and cocoa-nuts.

Landing is difficult in most parts of the bay. There is a depth of about 2 fathoms in the channel for boats between the reefs leading to the village.

Anchorage.—The best anchorage is N.W. by N., distant about a third of a mile from the west point of North island, in 14 fathoms water, over sand. There is also anchorage between North and South islands in depths of from 9 to 18 fathoms, over sand, north-westward of South island; both these are generally sheltered anchorages.

Directions.—Most of the following remarks are gathered from the chart and must be used with considerable caution:—The channel apparently now used is that northward of North island, and has depths of from 8 to 12 fathoms. The channel leading into Engano bay, between North and South islands, has depths of about 12 fathoms coral in mid-channel.

Plan, 2,761 [2,540]. Lat. 5° 18¾′ S. Long. 102° 8′ E.

Barohio anchorage, a little westward of the north point of Engano island, is a narrow inlet in the fringing reef, extending east and west nearly 8 cables, and having in mid-channel a depth of 6 to 8 fathoms, except near the head, where there are shallow patches of 3 and 4 fathoms near the landing place. This anchorage is not safe in the west monsoon.

Tides.—It is high water, full and change, at about 6h. 30m. near Barohio, springs rise 3 feet.

Kahek or Satu.—On the south-west side of Engano, in a small bay between Kahek island and the west coast, there is anchorage in about

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10 fathoms water, over sand, with the south extreme of the island bearing about W. by N., distant 3 cables, and Dadauwe village about N.N.W. The passage between the island and the point of the bay is 4 cables wide, but the reefs extending from both shores reduce it to about 2 cables, with depths of 5 to 6 fathoms on either side of a 2-fathoms patch in the fairway. The east shore of the bay is fronted by a reef to the distance of 2 cables.

Chart, 2,761 [2,540]. Var. 0° 5′ E.

St. Mary rock, on which the SS. *St. Mary*, drawing 17 feet water, struck, lies with Kowabi point bearing N. ½ W. distant 6½ miles, and Kenemei point N.W. ⅞ W.

Lat. 5° 36½′ S. Long. 102° 23′ E.

General chart, 2,761 [2,540].

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CHAPTER VI.

SUNDA STRAIT AND ITS APPROACHES, WITH THE OUTLYING ISLANDS.

Chart, 2,510 [2 542].
Lat. 11° 49′ to 12° 12½′ S.
Long. 96° 49½′ to 96° 56½′ E.
Var. 1° 50′ W.

THE COCOS OR KEELING ISLANDS.—General remarks. — The Cocos islands are situated about 600 miles in a south-westerly direction from Java head, nearly in the direct route of vessels *viâ* the cape of Good Hope. They are in two distinct divisions, lying north and south of each other, having a channel between them about 15 miles wide.

South Keeling.—The northern division consists of one island only, whilst the southern division or South Keeling, numbering about 20, form a roughly broken circle nearly approaching the horseshoe shape common to coral atolls. Selima island (pulo Atas) and Ross island (pulo Panjang), the two largest islands of this group, are about 5 and 6 miles in length respectively, and lie on the south-east and south-west sides of the group.

New Selima or Clunies Ross island, on which is the settlement, composed of the Cocos or Malay and Bantam villages, lies on the north-east side of the group. Direction island (pulo Tikus) and Horsburgh island (pulo Luar) are the northern of the group, between which is the channel to port Refuge.

Outside and nearly all round the group a natural barrier protects the lagoon, in which the water is smooth, but seaward of this barrier, on which the sea breaks continually, there is a sudden slope into deep water. The greater portion of the lagoon, which is 9 miles in length by about 6 miles in width, is filled with patches of growing coral, having deep water between, but it is only navigable by boats.

The land is evidently rising, and at some distant time will form a circular island, surrounded by a crater-like edge; at present the land is nowhere more than 20 feet above high water. The tops of the cocoa-nut trees, with which the whole of the islands are covered, may be seen from a distance of about 16 miles in clear weather.

Population.—In 1903, the population numbered 638—Cocos-born 567, Bantamese 71, and the staff of the Telegraph Company, numbering 31, who reside on Direction island.

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Piers.—A new pier 600 feet in length, carrying a light steel tramway, extends westward of New Selima island, just southward of the Bantam village; a small pier, extending in a southerly direction from the cable house, on the south-west side of Direction island, has a depth of 3 fathoms at its extremity. A steamboat can go to the former pier by keeping to the westward of it, until abreast it. Chart, 2,510 [2,542]. Var. 1° 50′ W.

LIGHT.—A *red fixed* light is shown from sheers on Direction island pier.

Communication.—Produce for the European market is called for once a year by a chartered vessel. Produce for Batavia is sent once a month by the family schooner, which returns with the necessary supplies for the islanders. It is visited occasionally by one of H.M. ships, and vessels belonging to the Telegraph Company call every 3 months with stores. Telegraphic communication with all parts, the office being always open.

Supplies.—Poultry is plentiful on the islands; the lagoon abounds with fish; turtle are taken in the season, and sharks are numerous. Deer, only found on Horsburgh island, are strictly preserved; jungle fowl are found on most of the large islands, and the frigate bird, when young, is said to be edible. There are a few fruit trees, such as bananas, papaws, guavas, and figs; pumpkins grow plentifully, but other vegetables are to be obtained only in small quantities. Water from wells, and of fair quality, can be put on board at a charge of 10 shillings per ton; there is no fresh water on Direction island, but the Telegraph Company have a distilling plant. A vessel of 178 tons has been built on the island, and boat building is extensively carried on.

Submarine telegraph cables.—A cable is laid to Perth, Western Australia, and another to Rodriques, thence to Mauritius.

Trade.—Copra is the only article exported, and cyclones, which are periodically experienced, seriously affect the crop; in 1902 the exports amounted in value to about 13,000*l*. The imports are provisions of all kinds, clothes, cutlery, guns, and most other necessaries of life.

Port Refuge, in the northern portion of the lagoon, consists of an outer and inner anchorage, the latter affording good shelter from the sea for vessels of about 20 feet draught; the outer anchorage has depths of from 4 to 5 fathoms. The inner anchorage is formed on its northern side by a spit with coral patches, partly awash at low water, extending S.W. by W. for 7 cables from the east end of Direction island and on the southern side by the numerous coral patches of the lagoon, and is a mile Plan, 2,510 [2,542]. Lat. 12° 5½′ S. Long. 96° 52½′ E.

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Chart, 2,510 [2,542]. Var. 1° 50′ W.

in length with breadths of from 1½ to 3 cables; it is entered by a very narrow channel, between the tongues of the spits, on the south-east side of the outer anchorage.

A detached patch, with about 2½ fathoms water over it, lies immediately westward of the extreme of the northern spit, and several detached shoals, with about the same depth over them, lie on the south-west side of the outer anchorage.

Lat. 12° 5¼′ S. Long. 96° 52¼′ E.

Buoys.—A buoy, painted red, and moored in 4 fathoms water, marks the southern side of the detached patch of 2½ fathoms on the northern side of the entrance to the inner anchorage, with the north-west extreme of Direction island bearing N.E. ¾ E., distant about 7 cables.

A buoy, painted red, is moored, in a depth of 3¾ fathoms, on the edge of the reef bounding the northern side of the inner anchorage, with the south-west extreme of Direction island bearing N. ⅝ W.

The positions of the buoys are only approximate, therefore no dependence should be placed on them. In 1904 they were in line with the trees on Workhouse island, bearing East.

Anchorage.—In 1904, H.M.S. *Diadem* anchored in 7½ fathoms water with the west extreme of New Selina bearing S.E. ¾ S., and the north extreme of Direction island E. ⅛ N., but as the configuration of the latter island on its northern and south-western sides is considerably altered by the cyclone of 1902 it will probably be found that bearings of other objects, taken from this position, may not agree. This anchorage is stated to be unsafe, except with steam ready, as, at times, heavy rollers come in without warning.

In the inner harbour there is good anchorage in 7 to 9 fathoms water, over coral and sandy bottom, good holding ground, with the extremes of Direction island bearing E. by N. ¼ N. and N. by E. ¾ E. A second anchor should be always in readiness to let go.

Directions.—It is recommended to steer for the west extreme of New Selima island bearing S.E. ¾ S., and to be prepared to anchor directly if the bottom is seen.

The passage to the inner anchorage should not be attempted unless the reefs are plainly visible, and it is advisable to obtain the assistance of Mr. Ross, the proprietor, who has an intimate knowledge of all dangers. It is stated that from the growth of weed the deep water is not so easily distinguished as formerly, and the tidal streams set across the entrance.

Tides.—It is high water, full and change, at 5h. 30m.; springs rise 4¼ feet.

Tidal streams.—The flood stream sets into the harbour at the rate of 1½ miles an hour. The current running past the islands to the

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north-westward, about 18 miles per day, is increased by the flood stream; with the ebb tide the current is counteracted, and there is little or no stream. Chart. 2,510 [2,542]. Var. 1° 50′ W.

Cyclones are experienced periodically and cause great destruction, and in January 1876, a cyclone, accompanied by a tidal wave, destroyed the storehouses, engine house and mills, and most of the dwellings, the corrugated roofs of some of them being carried away by the wind for several miles; a slight earthquake accompanied it, causing a black fluid to arise in the southern portion of the lagoon, and which, overspreading it, destroyed nearly all the fish and corals.

Cyclones were experienced on 4th February 1894, and on 4th March 1902, when a great number of cocoa-nut trees were destroyed; the lowest reading of the barometer during this latter storm was 28·90 inches, the wind being East.

North Keeling island, situated 15 miles northward of the South Keeling group, is one low island lying on a reef about one mile in length in a north and south direction and half a mile in breadth. The island is a strip of low coral surrounding a lagoon and thickly covered with cocoa-nut trees; the cabbage tree and iron wood tree also grow. There is a small break in the island on the eastern side, but the passage is not available for entering the lagoon. Lat. 11° 50′ S. Long. 96° 49½′ E.

Mineral springs exist on North Keeling, which is regarded as the Sanatorium of the islands, cases of beri-beri being sent to it for treatment. On the western side of the island there is a house, a well and a store of food for the use of shipwrecked persons.

A spit is reported to extend about one mile northward of the island, and heavy rollers at times rise suddenly off the south point, making it dangerous to approach. A bank is reported to extend for a distance of 5 miles south-south-west of the island, and also for 3 miles to the eastward.

Supplies.—Jungle fowl exist in great numbers, but, owing to the thick bush, are not easily shot; the island is also a great resort of sea birds. Turtle abound in the lagoon as well as quantities of various fish, including grey mullet, sharks, and dog fish; the seine cannot be used with any effect, but there is a fish which may be taken on a rod. Good water may be obtained from a well near the landing place.

Landing.—The only landing is on the west side of the island, through a passage in the barrier reef about 20 feet wide, and is not

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Chart 2,510 [2,542]. Var. 1° 50′ W.

always practicable on account of the surf; September, October, and November are the best months for landing.

Anchorage.—H.M.S. *Vestal*, 1902, anchored in 5 fathoms water with the west extreme of the island bearing S. $\frac{1}{8}$ W. and Wreck point N.E. $\frac{1}{8}$ E., but the anchorage is unsafe as rollers sometimes set in suddenly, and steam should be ready to leave if the wind shifts to the westward of North.

Chart, 941*a* [2,555]. Var. 0° 30′ W.

CHRISTMAS ISLAND.—General remarks.—Christmas island, situated about 220 miles southward of Java head, lies nearly in the track of sailing vessels proceeding to Sunda strait from the Cape of Good Hope in the months of April to September, and also from Sunda strait in the opposite or north-west monsoon period.

The island, of limestone formation, densely wooded and "steep to," is about 12 miles in length, in a north-east and south-west direction; Murray hill, near its western end, attains a height of 1,170 feet, and near its south-eastern end Ross hill is 1,010 feet above high water, and in clear weather the island may be seen from a distance of 30 miles or more.

Lat. 10° 29′ S. Long. 105° 38′ E.

It is quadrangular in shape, the north, south, and east sides being each about 9 miles in length, and the west 4 miles. Seen from the northward or southward, it is saddle-shaped, the middle of the island being considerably lower than the east and west portions. The slope from the coast cliffs to the hills is gradual in most places, but here and there perpendicular cliffs of limestone crop up. Towards the summit the patches of cliff become fewer and the soil richer. Three of these cliff terraces were met with in the ascent to the summit from the landing near North-west point.

The sea face of the island is composed of perpendicular and almost continuous cliffs, about 30 feet high, much underworn in places, rendering the island inaccessible, except where in a few places the cliff has crumbled away and formed a rough beach of fragmentary rocks, on which, when it is the lee side, landing may at times be effected. Except in Flying Fish cove the depths at one cable or less off-shore are about 100 fathoms, affording no anchorage. Depths of about 1,000 fathoms are found from 2 to 3 miles off-shore; the bottom off the east side is of a volcanic nature.

Plan, 3,504 [3,446]. Lat. 10° 25½′ S. Long. 105° 43′ E.

Flying Fish cove.—The north side of Christmas island, between North-west and North (Rocky) point, forms a curve of about 2 miles in depth, in the eastern corner of which is Flying Fish cove, a bight about half a mile broad and 2½ cables deep, in which there are wharves for the shipment of the phosphates, and off the wharves are moorings for vessels up to 6,000 tons.

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Settlement.—The settlement of the Christmas island Phosphate Company, situated in Flying Fish cove, consists of houses for the Europeans and quarters for the Chinese and Malay employés, also store-houses and hospitals. A magistrate's house and police station have been erected. In 1904 the population consisted of 12 Europeans and about 1,000 mixed nationalities, mostly Chinese coolies. Chart, 3,504 [3,446]. Var. 0° 30′ W.

Communication.—A steamer, belonging to the Phosphate Company, makes regular passages between Singapore and the island.

Supplies.—Stores for the settlement are brought from Singapore once a month. The large fruit pigeons of the island are very numerous, as also are frigate birds and boobys. Cocoa-nuts, bananas, and vegetables are grown, and various fruit trees have been introduced. But little dependence is placed on fishing as a food supply, probably owing to the fact that during the westerly monsoon, on many days, no boat can safely be launched. There is a plentiful supply of good drinking water which is obtained from the waterfall about 4 miles distant from Flying Fish cove, and brought to the settlement through pipes. Ships cannot depend on being supplied with either provisions, water, coals, or stores.

Piers.—There are two loading piers, each 70 feet in length, off which vessels lie and receive the phosphate by shoots, but as those, drawing over 23 feet water, find it difficult to berth, an extended pier is intended, which will have a depth of 30 feet alongside at lowest tide and accommodate two vessels at a time.

Mooring buoys.—There are mooring posts for sternfasts, also mooring buoys for vessels and lighters, the latter being on the west side of the cove.

Position.—The observation spot is at Red rock, on the south side of the cove. Lat. 10° 25′ 19″ S. Long. 105° 42′ 57″ E.

Trade.—Phosphate, of which two kinds, lump phosphate and granulated phosphate, are found on the island, is the only article exported.

Landing.—The landing-place in Flying Fish cove is on the beach, near the phosphate shoot, through a break in the fringing reef. At a similar beach, 2 miles eastward of North-west point, a narrow sandy channel, about 80 feet in length, leads through the fringing reef to the beach, where landing may be easily effected. It is stated that landing is difficult from December to April on account of heavy swell, not from wind.

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Chart, 3,504 [3,446]. Var. 0° 30′ W.

Anchorage.—Vessels, approaching the cove to load with phosphate, lower an anchor with from 30 to 60 fathoms of chain out, according to the size of vessel, and steam slowly in, but it is advisable not to attempt to make the anchorage at night, nor unless one of the Company's pilots is on board. As soon as the anchor takes the ground a little more chain is paid out, and a warp from the bows run to one of the mooring buoys to prevent the anchor slipping off the ledge; a stern hawser is then made fast to a buoy and the stern warped round to the shore, which, at the centre berth, will be about a cable off, the stern being in 5 fathoms, and the bow in 30 fathoms, water.

Great caution is necessary at this anchorage, and steam should always be ready, as although for the greater part of the year there are no on-shore winds, a confused swell sometimes sets into the cove, and if making more than the briefest stay a second anchor should be down; the Manager will afford any assistance possible in berthing.

A red flag hoisted at the storage shed denotes that the anchorage should not be attempted.

It is stated that it is impossible to load during the N.W. monsoon, except on a few exceptional days of fine weather, but it also appears that during the year 1899 there were only 19 days on which loading could not have gone on, 17 of these being in February and 2 in November.

The bottom is rocky in these anchoring depths, with growing coral, but between them and the shore there is a belt of white sand nearly clear of rock.

A new anchorage is reported to have been found on the south-east side of the island, which it is hoped may be serviceable during westerly winds.

Tides.—It is high water, full and change, at Christmas island, at 7h. 20m., springs about 3 feet.

Tidal streams.—The flood streams set to the north-eastward and ebb in the contrary direction, the latter sometimes attaining a rate of 2 knots an hour.

Winds.—Easterly winds are the most prevalent, and from observations made in 1901–1903 were blowing for an average of 145 days in the year; others recorded were:—S.E., 44 days; N.E., 27 days; N.W., 21 days, and North, 16 days. Calms prevailed on 94 days. The minimum force of wind is from January to March inclusive, and this is the time of greatest rainfall; the easterly winds bring dry weather; gales do not occur, and strong winds are of comparatively rare occurrence.

Chart, 2,056 [2,545].

SUNDA STRAIT.—General description.—Sunda strait, through which passes a large portion of the trade of China, as also most

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of the trade of Batavia, Singapore, and other ports in the Java and China seas, separates the large islands of Java and Sumatra. Its western entrance, between Java head and cape Ṛada, is 58 miles wide, in a north-west and south-east direction; and from the western to the eastern limit of the strait, which lies between St. Nicolas point and the opposite coast of Sumatra, the distance is 70 miles, the general direction of the track for shipping being about N.E. and S.W. The narrowest part of the strait, about 13 miles wide, is abreast Fourth point, being here divided into two channels, each about 4 miles wide, by Thwartway island.

Chart, 2,056 [2,545]. Var. 0° 20′ E.

Lat. 6° 4′ S. Long. 105° 53′ E.

In the strait are several islands forming different channels, by which it may be entered from the westward; but Princes channel and Great channel, both on the south side, are those most commonly used.

The Great channel is limited on the north side by the conspicuous Krakatoa island, between which and the coast of Sumatra are three channels, formed by Sebesi and Sebuku islands, all now very dangerous and to be avoided.

Pilots.—European and native pilots may be obtained at Anjer Kidul and Old Anjer.

Volcanic eruption.—The volcano of Krakatoa island was in eruption in the year 1680, and although included within the category of active volcanoes it remained in a state of comparative inactivity for upwards of 200 years.

Lat. 6° 8½′ S. Long. 105° 26′ E.

On May 20th, 1883, the volcano burst into eruption, accompanied by earthquakes, which were severely felt at Batavia, and at the same time vast showers of pumice and ashes were projected to a great distance. This eruption was observed from the Imperial German ship *Elizabeth*, and on the following day, when 100 miles from Krakatoa, a shower of dust was experienced which was estimated to become a layer one inch in thickness in 24 hours, and dust was observed to be still falling when the vessel had gained a position 300 miles south west of Sunda strait.

On 26th August 1883, Krakatoa again burst into eruption, and of such a terrible nature that miles of coast on both sides of the strait were wholly devastated, and multitudes of people perished. On the 27th August, a succession of earthquake waves swept the shores of the strait, utterly destroying the towns of Anjer, Merak, Charingin and Telok Betung, together with some of the lighthouses on both shores. This remarkable disturbance of the sea made itself felt in various parts of the world upon the same date, notably in Australia and Southern Africa, also at Karachi, in India.

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Chart, 2,056 [2,545].
Lat. 6° 8½′ N.
Long. 105° 26′ E.
Var. 0° 20′ E.

The vast amount of pumice which lay upon the surface of the sea, in some places many feet in thickness, gave an appearance as if the ocean bed had appeared above water.

The steam from the volcano was estimated to have been driven to a height of more than 12 miles, and the rain of ashes fell over all southern Sumatra and northward to Singapore, eastward to Batavia, and south-westward to the Cocos islands; finer particles of dust floating in the upper atmosphere enveloped the earth and caused brilliant sunsets up to December of that year. The sound of the explosions was heard at Perth in Western Australia, in New Guinea, Ceylon, and the island of Mauritius.

The tidal wave, which, where obstructed, increased greatly in volume, was observed at Toppers island to rise 72 feet; at Merak, between the island and mainland, about 120 feet; and from Hog point to Telok Betung, the average height was about 80 feet. Every object on the shore, in to the first range of hills, was levelled with the ground, and where the land was low the sea penetrated 5 miles inward. At Telok Betung the water rose to the square of the resident's house, 118 feet above high water; and the Government steamer *Berouw* was swept over the pier into the Chinese quarter of the town, a distance of nearly two miles from the anchorage. The undulation was felt on the north coast of Java; in Batavia road it rose 8 feet in height, and in Tanjong Priok harbour, on August 27th, from 12.30 to 1.30 p.m., the water suddenly fell 18 feet.

The island, for 100 feet up, remained a mass of glowing lava and stones; all animal and vegetable life was destroyed, and it was five years before verdure again returned.

According to official report 36,417 persons perished, 37 of these being Europeans.

Winds.—Owing to the direction of the strait, which induces the winds to draw through to the northward, the westerly monsoon blows stronger and more steadily than the easterly. The easterly monsoon begins in April, but unsettled weather, and winds shifting occasionally to south-west and north-west, continue during May, June, and July. In August and September the monsoon is at its height and blows constantly between south-south-east and east-south-east, especially at night under the coast of Java, when the land breeze comes off from the same quarter. In daytime, during these months, the sea breeze from the opposite direction will cause the wind to become unsteady on approaching the Java shore.

General charts, 2,761 [2,540], 1,653 [2,559].

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Towards the end of October westerly winds begin to appear, and at times blow from south-south-west to south-west; but the monsoon only becomes permanent in the latter half of November, with the wind between south-west and west-north-west. In December the general directions are west-south-west, in January west, and February west-north-west. In March the monsoon begins to abate, and the direction shifts back to west-south-west, with occasional variable winds. Chart, 2,056 [2,545]. Var. 0° 20′ E.

Calms are most frequent in March.

Showers fall at all seasons, but most abundantly in the westerly monsoon, being then often accompanied by thunderstorms.

From May to November the sky is hazy, particularly during the early hours of the day.

Considerable swell rolls into the strait in December, January and February, and the sea is heaviest when the tidal stream, combining with the prevailing south-westerly current, runs contrary to the wind.

In the northern approach to the strait, more markedly on the Sumatra side, during the easterly monsoon, the sea breeze from northward in the Java sea will in daytime draw the wind into the north-east; at such times, with an adverse tide, it would be advisable for sailing vessels to anchor under the Java shore.

Tides.—It is high water, full and change, in Mew bay at 6 hours; springs rise 3 feet. Lat. 6° 4′ S. Long. 105° 53′ E.

Tidal streams.—Through the narrow parts of Sunda strait a constant current runs south-westward; this is strengthened during one half, and counteracted during the other half of the day, by a strong diurnal tidal stream. Early in July the south-west going tidal stream attains its greatest velocity about 10 p.m., and the north-east going about 10 a.m.; the times will daily be sooner at the rate of two hours in each successive month, so that early in January the maximum strength to south-westward will be about 10 a.m., and north-eastward about 10 p.m.

These streams are strongest one day after that on which the moon's declination is greatest, and feeblest when the moon is near the equator.

When the current and tidal stream are in opposition, there will necessarily appear varying and conflicting movements of the surface waters; generally the effect is to check the current, or slightly turn it to the north-eastward.

Southward of Fourth point the combined streams seldom exceed a rate of 2 knots, but between Thwartway island and Java, as well as near St. Nicolas point, it may reach 2 to 4 knots. On the Zutphen islands

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Chart, 2,056 [2,545]. Var. 0° 20′ E.

side of the channel also, a strength of 4 knots will sometimes be found, running past the islands to Varkenshoek; thence with less force in the wider part of the strait.

Directions.—*See* pages 404, 414.

Lat. 6° 45¼′ S. Long. 105° 12½′ E.

SOUTHERN SHORE.—Java head, the western extremity of Java, is a bluff promontory at the foot of high land, and is discernible at a considerable distance in clear weather. (*See* light on First point, page 405.)

When making it in hazy weather, the appearance of the land to the eastward of cape Sangian Sira, between it and Sodong point, bears much resemblance to the high land of the west point of Java, with the adjacent hills on Princes island; and the low land in such circumstances not being distinguishable at a distance, the position of it has been in former times often mistaken for the entrance to Princes channel.*

Cape Sangian Sira.—From Java head the coast trends south-south-eastward for about 5 miles to cape Sangian Sira, the south-west extreme of Java, which is high and has two large rocks close to it. A cluster of rocks above water lies south-eastward of the cape, and others front the shore, the sea breaking heavily upon them all. The depths are considerable close to these rocks, and along the shore as far as Java head there is no bottom with 100 fathoms; it is advisable to give the shore a berth of at least 2 miles.

Mount Payung, 1,575 feet above high water, rises over cape Sangian Sira.

Chart, 1,653 [2,559]. Lat. 7° 0′ S. Long. 105° 3′ E.

Deli or Kelapa island, 3 miles in length in an east and west direction, one mile in breadth, is charted 7 miles from the nearest shore of Java, and about 20 miles, S.E. by E. ¾ E., from cape Sangian Sira, but is reported to lie 1½ miles further south-west. It is low and swampy in the middle, covered with tall trees (those along the beach being cocoa-nut), and is surrounded by a reef, which stretches off a distance of 1½ miles from the west point and in other directions nearly a mile. Along the north side there are from 12 to 14 fathoms water, and the depths are from 30 to 40 fathoms at 2 miles off the south coast of the island.

Water.—On the north-west side there is a good watering place in the south-east monsoon, and boats can enter through a channel in the reef.

Anchorage may be obtained in from 12 to 18 fathoms water, over sand and mud, between the island and the coast of Java.

General chart, 2,761 [2,540].

* *See* view on chart, 2,056 [2,545].

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Trowers or Sinjil island, 3 miles in length in an east-north-east and west-south-west direction and half a mile in breadth, is 10½ miles E. by N. from Deli island. It is low, altogether covered with cocoa-nut trees, and surrounded by a reef which does not extend from it more than a mile. These islands afford no shelter from southerly gales. Chart, 1,653 [2,55[illegible]]. Var. 6° 2[illegible] E.

Rock.—A rock on which vessels have struck is situated about one mile northward of the island, but its position is uncertain.

PRINCES ISLAND, or pulo Panaitan, separated from the west end of Java by Princes channel, is 12 miles in length by about 8 miles in breadth, and uninhabited. It is of an irregular form, projecting to a point on the north-east side, and having a large bay on the south-west side, the horns of which form the west and south points of the island. The middle and eastern parts of the island are hilly, the highest peak, mount Rakso, 1,450 feet above high water, being on the eastern side; but in some parts, particularly at the west end, the land is level and low fronting the sea; all parts of the island are thickly wooded. Chart, 2,056 [2,545]. Lat. 6° 36¼′ S. Long. 105° 11½′ E.

A fringe of reef extends from Parut point, the north-east extreme of the island, and along the shore on each side. A similar fringe extends about a third of a mile off Semadang point, the south-east point of the island, and a coral reef on which the sea always breaks lies half a mile off the point westward of it. The fringing reef continues along the shore to the south point enclosing the conspicuous White rock, north-eastward of which is a reef which always breaks.

The reef which fringes the north-west and north sides of the island is "steep-to," and off Kadam point lies a small islet.

Carpenter rocks.—The south and south-west extremes of Princes island are fronted by the Carpenter and Princes reefs, respectively, the former extending to the distance of about one mile. Most of the Carpenter rocks are above water, and the sea is usually breaking over them. Princes reefs are broad sandbanks with rocks above water, which, with Waton island lying on the bank, extend nearly 2 miles south-westward.

Kasuaris bay, on the south-west side of the island, is 4 miles deep, and has at its entrance depths varying from 30 to 50 fathoms, decreasing within to a convenient depth for anchoring; but being open to all winds between west and south, it is not frequented, and cannot be recommended.

Anchorage may be obtained near Pamagaran bay in 13 fathoms water, with Panhaitan hill bearing W. ⅝ S., and Parut point N. ¼ W.

General chart, 2,761 [2,540].

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Chart, 2,056 [2,545].
Lat. 6° 34′ S.
Long. 105° 15½′ E.
Var. 0° 20′ E.

Water.—Rangat bay is southward of Pamagaran bay, and here water may be obtained from a stream during the north-west monsoon, but at other seasons the stream is dry, and it would be preferable to water at Mew island; *see* page 405.

PRINCES CHANNEL, between Carpenter rocks off the south end of Princes island, and Friar rocks off First point of Java, is 3½ miles wide, and possesses the great advantage of affording anchorage to sailing vessels when becalmed, which Great channel does not. Light baffling winds and calms are very common about the entrance to Sunda strait, occurring even in the strength of the south-east monsoon, and vessels when not able to anchor are liable to be set back by adverse currents.

The depths in this channel are much greater on the Princes island than on the Java shore. Near to Carpenter rocks there is no bottom at 50 fathoms; towards Mew bay, on the Java shore, the depths decrease to 20 fathoms and less.

Directions.—In the south-east monsoon, when proceeding either way through Princes channel, keep closer to the Java coast than to Princes island.

In the north-west monsoon, it often happens that sailing vessels, bound out of the strait, get quickly to the westward by proceeding through Princes channel, while those using Great channel are detained by heavy squalls and adverse currents. Indeed, instances have occurred in which vessels have worked through this passage in a remarkably short time during a westerly gale, by carrying a heavy press of sail and tacking between the squalls, when it was impossible for any vessel in Great channel to beat against the current and heavy sea.

In this monsoon, especially when working out, it is advisable to keep near the island shore, for the vessel may be assisted by a current which will then sometimes be found setting to the westward, and avoid being set by the heavy swell upon the rocks near Java head. A sailing vessel near the Java shore, and outside anchoring ground in a calm, might be in considerable danger.

GREAT CHANNEL lies between the north point of Princes island and the south point of Krakatoa island, which are 23 miles apart; and although too deep for anchorage, it is much frequented, being the widest passage into the strait, and is considered to be clear of danger. As far as at present ascertained, the eruption of Krakatoa has not affected the navigation of this channel. Entering by this channel, vessels should keep nearer Princes island, and when farther in the strait borrow on the Java side.

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JAVA COAST.—First point.—The coast between Java head and First point is fronted by high rocks, stretching out a considerable distance in some places. First point, the south point of entrance to Princes channel, is wooded with high trees and has a conspicuous rock lying abreast of it, which rises abruptly out of the sea, and is "steep-to." Close to the northward of First point there is another rock above water, which together with the former are named Friar rocks. About a mile eastward of First point, and close in-shore, is the Mewstone, a small rock above water.

Chart, 2,056 [2,545]. Var. 0° 20′ E.

LIGHT.—A stone lighthouse, 160 feet in height and painted white, on First point, exhibits, at an elevation of 260 feet above high water, a *white flashing* light with a period of system of *half minute*, each flash being of *six seconds* duration, followed by an eclipse of *twenty-four seconds*. The light should be visible, in clear weather, from a distance of 23 miles, between the bearing of N. 19° W., through north, to N. 56° W., except where obscured by Princes island. The keeper's dwelling, painted white, is near the lighthouse.

Lat. 6° 45′ S. Long. 105° 12½′ E.

Mew island (Kanti), lying about 2 miles eastward from First point, is 130 feet above high water, 1½ miles in length, in a north and south direction, by one mile in breadth, hilly, and wooded; it is surrounded by a small coral reef. The shore is rocky on the seaward sides of Mew island, but safe to approach, the depths decreasing gradually to 8 or 9 fathoms.

Between Mew island and the coast of Java there is a narrow but safe channel with depths of from 5 to 10 fathoms, over sandy bottom.

In the northern part of the channel a coral reef, drying at low water, lies about 2 cables eastward of the east point of the island, and Watson bank, which is awash and sometimes breaks, lies about a cable from the Java shore on the south side; a 3-fathoms shoal lies 2 cables southward of the island. The channel is towards the island shore.

Anchorage may be obtained on the eastern side of the island in from 10 to 20 fathoms water, over sand, and on the west side in depths of from 6 to 16 fathoms, over the same bottom.

In the south-east monsoon there is also good anchorage a little farther out, in 16 to 19 fathoms, over sandy bottom, with the north point of Mew island bearing about W. ½ S., and the east point S. by W.

Water.—To the eastward of Mew island, on the Java coast, there is a good watering place in the south-east monsoon; the water is excellent, and falls in a cataract upon the beach. Large boats may approach this

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Chart, 2,056 [2,545]. Var. 0° 20′ E.

spot at high water through a narrow channel in the reef, and fill the casks by a hose.

A little to the northward of the watering place, and about half a mile from the coast, lies a coral reef about a cable in extent, with one fathom least water over it, and 5 to 6 fathoms around. A vessel standing in for the watering place must steer between this reef and the island, and anchor in 9 or 10 fathoms.

Plenty of wood may be obtained from Mew island or from the mainland.

Tides.—It is high water, full and change, at Mew bay at about 6h.

Sinini point is a broad, low, projecting point, 5½ miles north-eastward of Mew island, with depths of from 14 to 19 fathoms 3 cables off it. The coast between First and Second points is low, wooded, and with here and there sandy beaches.

Lat. 6° 38¾′ S. Long. 105° 22¼′ E.

Second point consists of a low, wooded foreland, somewhat broad in appearance, situated about 12 miles north-eastward from First point. It may be approached without danger to the distance of one mile, and in from 26 to 20 fathoms water, the reefs projecting but a short distance off shore.

Between Mew island and Second point, reefs project half a cable from the shore, having from 5 to 6 fathoms water close-to, which increases rapidly to 10 and 20 fathoms; with due attention to the lead, a vessel may approach the shore in order to anchor. Sometimes native craft may be met, having turtle, fowls, and cocoa-nuts for sale.

WELKOMST BAY.—At a distance of 20 miles north-eastward of Second point is Third point, and between is a deep bight, named Welkomst bay, which affords good shelter in the south-east monsoon, but should be avoided in the north-west monsoon. There is, however, said to be good anchorage in the north-west monsoon, when the wind is not too northerly, south-eastward of Second point, in from 9 to 10 fathoms water; but this anchorage should be approached with caution, as the soundings decrease suddenly to 2 fathoms on the edge of the reef which fronts the shore between Second and Tembing points.

The West shore of the bay trends southward for 11 miles from Second point; about the middle the coast forms a bight, with a depth of 4 fathoms at its entrance, but only one fathom a short distance within. The whole of this side of the bay is skirted by reefs.

Andelan islands are three in number, the two western lying in an east-south-east and west-north-west direction from each other in south-

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west part of the bay, 7 miles from Second point; the third island lies north-eastward of these. Chart, 2,056 [2,545]. Var. 0° 20′ E.

Dangers. — Panter reefs, the outermost known danger in the bay, lie nearly midway between Second and Palagan point and E. $\frac{7}{8}$ S. distant $5\frac{1}{2}$ miles from the former. Lat. 6° 39¾′ S. Long. 105° 28′ E. They consist of four different patches extending 5 cables in a north-north-east and south-south-west direction, have a least depth of $1\frac{1}{2}$ fathoms over rock, and are surrounded by depths of 9 and 10 fathoms, over clay. They almost always show discoloured water and break.

Rocky ridge is about 100 yards in length, partly above water, and always marked by breakers, by which it may be distinguished at some distance. It lies about half way between the western shore of the bay and Panter reefs, with Second point bearing N.W. by W. $\frac{3}{4}$ W., distant $3\frac{1}{2}$ miles, and has depths of 10 to 12 fathoms around it.

Eastward and south-eastward of the middle and largest Andelan island lie two sandbanks above water, surrounded by a sunken reef, with depths of from 4 to 6 fathoms, over mud, between them and the island; between these islands and the shore the depths are from 4 to 9 feet.

Three islands are situated on the mud banks in the southern part of the bay.

A large portion of the bay within Panter and Rocky ridge reefs has not been examined, but it is supposed to contain several shoals. The distance from the southern shore of the bay to the south coast of Java is about a mile, and the sound of the surf may be distinctly heard across the isthmus.

The East shore of the bay northward of Badui islet, which lies N.E. by E. distant 5 miles from the Andelan islands, has general depths of 15 to 24 fathoms at some little distance from it, with several islets and dangers.

About 5 miles north-eastward of Badui islet is Palagan point, with some islands off it, the southernmost of which is named Mangir, and the others Uwar, Umang, and Sumur. These islands, as well as Palagan point, are surrounded by reefs, a cable in breadth, but at one mile seaward there are depths of 15 fathoms, over mud.

Mount Honjeg, a double topped summit, 2,044 feet above high water, is abreast Badui islet, and about $2\frac{1}{2}$ miles inland. Lat. 6° 43½′ S. Long. 105° 34½′ E.

Dangers.—Southward of Badui islet, near Tanchang Pare point, are many coral rocks, for the most part dry at low water, with depths of 7 to 9 fathoms between them.

A large coral rock above water, usually covered with a heavy surf, lies W. $\frac{3}{8}$ N. about $1\frac{1}{2}$ miles from Badui islet, and near it appear to be

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Chart, 2,056 [2,545]. Var. 0° 20′ E.

other reefs; between Badui islet and the above rock there are depths of from 6 to 12 fathoms.

A coral reef extends to the northward of Chemara point, 4½ miles north-eastward of Palagan point, and fringes the coast to the northward to Third point.

Lat. 6° 28′ S. Long. 105° 40′ E.

THIRD POINT, like Second point, is very low, but sharper, and a little higher, being 45 feet above high water; it is fronted by rocks to the distance of 2 cables, from which the depths increase to 10 and 18 fathoms.

Batu Hidueng, a hill situated 4 miles southward of Third point, is 900 feet above high water, and possibly easily recognised.

PEPER BAY.—Pepoli island lies about 9 miles north-eastward from Third point, and between is Peper bay. Its shores are generally sandy and fronted by reefs which, near the points, project about half a mile, increasing their distance from the shore towards the depth of the bay, where they extend 1½ miles. Several rivers run into the bay, the principal one being Chi Liman. The depths in the bay generally decrease uniformly from 14 to 4 fathoms; the latter depth will be found 2 miles off shore.

Coral bank, nearly 2 miles eastward from Third point, is about 4 cables in length in a N.W. by W. and S.E. by E. direction, the greater part being above water; the channel between the bank and Third point has depths of from 4 to 9 fathoms.

Lawungan islet, low, wooded, and situated at the head of Peper bay, is about three-quarters of a mile in length by a quarter of a mile in breadth, and surrounded by a reef which projects 1½ cables from the north side of the islet.

Three-quarters of a mile to the north-westward and westward of Lawungan islet are two reefs, partly dry at low water, and usually breaking.

To the southward, and in mid-channel between Lawungan islet and the shore, is a reef with 3 feet water over it, between which and the island there are depths of from 3 to 4 fathoms.

Anchorage.—In the easterly monsoon there is safe anchorage north-east of Lawungan islet, in 6 or 8 fathoms water, over mud.

Lat. 6° 24′ S. Long. 105° 48½′ E.

COAST.—Pepoli island, small, round, and about half a mile in diameter, lies within one mile of the shore, with which it is connected by a reef; there is, however, a channel with from 1½ to 2 fathoms water through this reef available for boats.

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Panjang reef, one mile south-westward of Pepoli island, is one mile in length, in a north-north-west and south-south-east direction, half a mile in breadth, with a least depth of 3 feet over it. This reef, being "steep-to," is dangerous, as the sea does not often break upon it; but by keeping a good look-out it may be distinguished by the light colour of the water and its brown patches. Between the reef and the island there is a depth of 7 fathoms, over mud. Chart, 2,056 [2,545]. Var. 0° 20′ E.

Kebua reef, about half a mile in extent, lying 2 miles northward of Pepoli island, and two-thirds of a mile off the shore near Charingin, is of coral, partly above water, generally breaks, and is "steep-to." Between this reef and a rock near the shore there is a depth of 6 fathoms.

Anchorage.—A convenient anchorage in 7 fathoms water, over clay, will be found to the northward of Kebua reef, at 1½ miles off shore, with Pepoli island bearing S. by E.

Coast.—From Charingin point the coast trends to the northward for 4½ miles to Silaban point, which is rocky, and has rocks above water lying off it.

Nearly 10 miles east-south-eastward of Silaban point is mount Pulu Sari, 4,396 feet, and Mount Karang, 6 miles north eastward of mount Pulu Sari, has three summits, the highest being 5,833 feet above high water. Lat. 6° 20½′ S. Long. 105° 58½′ E.

Rocky point, 7½ miles northward of Silaban point, may be known by a small hill which lies near the coast, northward of the point, where there are some small rocks, and northward of these a small river enters the sea.

The appearance of this coast is low, though occasionally interrupted by hills and rocky points; it may be approached to a depth of 12 to 15 fathoms. Several streams run into the sea, and there are scattered villages; landing is easy when the surf is not too high, and anchorage may be obtained all over the off-lying bank.

Catherine rock, lying about 2 miles to the northward of Rocky point, and half a mile off shore, is about 2 cables in length, in a north-north-east and south-south-west direction and one cable in breadth, with two rocky heads above water near the centre, and which are visible about 3 miles. A small coral reef with 3¼ fathoms water over it, which shows discoloured water, lies 3 cables N.N.W. of Catherine rock, with 6 fathoms between. The coast should not be approached to a less depth than 12 fathoms, which is found about a mile off, with a bottom of sand and mud. Lat. 6° 8′ S. Long. 105° 51¼′ E.

Submarine telegraph cable.—The cable house and shore end of the submarine telegraph cable, from Kalianda in Sumatra, is situated

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

southward of Catherine rock, and 5 miles southward of Fourth point. Vessels should avoid anchoring near it.

FOURTH POINT, distant nearly 27 miles north-eastward from Third point, is low, but easily discerned from its numerous cocoa-nut trees. A reef fringes the shore to the distance of 1½ cables.

Lat. 6° 4′ S. Long. 105° 53¼′ E.

LIGHT.—On Fourth point stands an iron tower, 190 feet in height and painted white, which exhibits, at an elevation of 180 feet above high water, a *white flashing* light, with a period of system of *fifteen seconds* which shows a *flash* for *five seconds* followed by an eclipse of *ten seconds*, and should be visible, in clear weather, from a distance of 20 miles.

Lloyds signal station.—Anjer settlement at Fourth point is a Lloyds signal station with a semaphore and port office. Vessels will be signalled free of charge to Batavia.

Water.—Anjer Kidul is a village near Fourth point, and here the Chi Koneng river runs into the sea and is accessible for boats when the surf allows. Drinking water, free of charge, may be obtained.

Anchorage off Fourth point is exposed and only available with easterly winds; the bottom, of coral thinly overlaid with sand and mud, forms bad holding ground. One mile from the shore the depth is 30 fathoms.

Charts and sailing directions for the Netherlands Indies may be procured from the Harbour Master.

Pilots for the strait and the coast of Batavia are stationed at Anjer Kidul and at Old Anjer.

Lat. 6° 6′ S. Long. 105° 56½′ E.

Anjer peak, 1,936 feet above high water, is situated about 3½ miles south-eastward of Fourth point.

Old Anjer, situated 2½ miles north-eastward of Fourth point, is a thriving village on the site of the town, destroyed by the earthquake and tidal wave in 1883; the inhabitants live by fishing and by furnishing supplies to passing ships.

Anjer river, close westward of this settlement, is 40 yards in breadth, with a depth of 3 to 6 feet at low water, and affords good landing for boats in the easterly monsoon; but Paku river, situated half a mile to the northward, and which has a least depth of from 2 to 3½ fathoms, is to be preferred. Paku river is about 80 yards wide, and has some rocks near the entrance, which may be avoided by keeping close over to the reef extending from the south point.

Supplies, &c.—During the south-east monsoon, vessels, both outward and homeward bound, occasionally call at Anjer for supplies.

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Buffaloes, poultry, vegetables, fruit, hogs, sheep, turtle, and water are to be procured. Native craft from Anjer, with supplies, may be met with in Sunda strait, and even as far northward as the Brothers. Plan, 2,056 [2,545]. Var. 0° 25′ E.

Anchorages.—There is anchorage in Anjer road in 14 fathoms water, over mud, with fair holding ground, with Fourth point bearing S.W. ¼ S., and the summit of Thwartway N.W. ¼ N. at half a mile from the shore reef; from thence the depths decrease uniformly to 8 fathoms at about a cable from the reef which fringes the shore.

This is but an indifferent roadstead in the north-west monsoon, and landing is then dangerous on account of the high surf. Sailing vessels have frequently found themselves in dangerous proximity to this reef from anchoring in too little depth of water, and with no room to veer in the event of sudden and violent squalls, which are frequent at this season.

During the easterly monsoon, small craft will find anchorage in from 4 to 5 fathoms water, within the entrance of the river, avoiding patches of 2 fathoms (the ruins of the former settlement).

COAST.—Lening point, 4¾ miles north-eastward of Fourth point, is formed by a spur of mount Marengmeng; close to the southward of the point there is a small hill by the shore, which here is rocky and fringed by a small reef. Lat. 6° 1½′ S. Long. 105° 57′ E.

A small reef, with 2 fathoms least water over it, lies 2 cables northward of the point; between the reef and the shore there is a depth of 8 fathoms.

THWARTWAY ISLAND, or Pulo Sangian, 505 feet above high water, lying in the middle of the narrowest part of Sunda strait, is easily recognised by its irregular shape. From the north-eastward or south-westward, the island appears as five islets, the earthquake wave having swept through it, destroying all the trees in the low ground and valleys, but there is no change in the contour of the island or in the depths around. It is 2¼ miles in length in a north and south direction, and "steep to" on its northern and eastern sides beyond one cable distance. Off its southern extremity a reef projects about 3 cables, on which is a rock above water; off the reef are depths of 13 fathoms. Lat. 5° 57′ S. Long. 105° 50¾′ E.

From the south-west point of the island a bank of sand about a mile in breadth, and with depths of from 17 to 20 fathoms, extends S.W. ½ W. for a distance of 6 miles.

Anchorage.—The west side of the island forms a bay, in which there is temporary anchorage in 13 fathoms water, over sand, with the

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

extremes of the island N. ¾ W. and S.E. by E. ½ E. The usual south-westerly set in Sunda strait causes strong eddies in this bay.

Brabands island, 154 feet above high water, and about a cable in diameter, lies about 4 miles south-eastward from Thwartway island, and rather more than a mile from the shore.

Browers sand is the name given to the two patches, with depths of 4½ and 5 fathoms over them, situated near the south-west end of the tongue of sand extending about 3 miles in that direction from Merak island, at 1½ miles off the coast of Java. The southern patch, with 4½ fathoms water over it, lies with the highest part of Merak island bearing N.N.E. ⅝ E., distant 2½ miles.*

Krunjo rock, with 1½ fathoms water over it, lies about 2 cables off the coast of Java abreast Browers sand.

The depths close to the west side of Browers sand are from 10 to 15 fathoms, increasing to 19 and 20 fathoms at the distance of one mile, with hard bottom. When standing towards the shore, keep without the line joining Fourth point and Brabands island.

Anchorage.—Between Browers sand and Merak island there is convenient anchorage for vessels working through Sunda strait.

Plan, 2,056 [2,545]. Lat. 5° 56′ S. Long. 105° 59½′ E.

MERAK ISLAND, near the Java coast, is 220 feet above high water, nearly round, and about half a mile in diameter; it is wooded and surrounded by a small coral reef. Within it is New Anjer road.

Little Merak island, low, and about a cable in extent, lies near the shore, about half a mile south-eastward of Merak island; a large tree stands near the north point.

Two small 3-fathoms patches lie south-south-eastward of the island at distances of 2½ and 3½ cables respectively.

Tarrembu reef, lying between Great and Little Merak islands, is about half a cable long east and west, and a cable broad, and has a rock on its centre drying at low water, from which the high tree on Little Merak bears S.E. ⅓ S.

Nearly half a cable northward of the reef there is a patch with a depth of 3¼ fathoms over it, and one cable north-east, another patch with from 4 to 4¾ fathoms water.

Java reef.—A small patch of rock and coral, with a depth of 4½ fathoms over it, and "steep-to" nearly all round, lies with the highest part of Merak island bearing about S. ½ E., distant one mile. When the current is running from one knot to 2 knots an hour, the patch is marked by ripples, and sometimes by discoloured water.

General chart, 1,653 [2,559].

* Browers sand, previous to the earthquake, had in one place a depth of only 1½ fathoms, with a general depth of 3½ to 4 fathoms.

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NEW ANJER ROAD, nearly half a mile in extent, is situated between Merak islands and the main coast of Java. Plan, 2,056 [2,545]. Var. 0° 25′ E.

New Anjer.—The settlement of New Anjer, formed here when Old Anjer was destroyed by the earthquake, has since been transferred to Fourth point, and only a few native huts remain.

Anchorage.—The anchorage with south-west winds, is northward of Tarrembu reef and other patches, in from 8 to 10 fathoms water, with the northern hill of Merak island bearing West. It is not considered safe for large vessels in the north-west monsoon, as a heavy swell sometimes sets into it, but small vessels will always find shelter under Merak island.

Directions.—The channel into the road north of Merak is the one recommended; it is more than a cable in breadth, and has depths of 7 to 10 fathoms. In entering, keep close along the side of Merak island; the small reef fringing it shows discoloured water. Steam vessels may enter the harbour by the south channel, on either side of Tarrembu reef, as there are depths of from 5 to 8 fathoms water in both, but it is not practicable for sailing vessels, as there is always a strong adverse current.

ST. NICOLAS POINT.—The coast from Merak island trends in a north-easterly direction about 5 miles to St. Nicolas point, 45 feet above high water, covered with trees, and the extreme end of the bold promontory (of which mount Gedeh, 1,968 feet above high water, is the summit), forming the north-west end of Java island. Dangers extend about a third of a mile off St. Nicolas point, with a depth of 11 fathoms close-to. Chart, 2,056 [2,545]. Lat. 5° 52½′ S. Long. 106° 2¾′ E.

About midway between Merak island and St. Nicolas point is Tamposo islet, near the edge of the reef fringing the coast which extends about a third of a mile off; close to this reef are depths of from 10 to 15 fathoms. This coast should not be approached to a less depth than 18 fathoms, unless seeking anchorage, when the wind and current are unfavourable; good anchorage may be found off some of the bays in from 8 to 10 fathoms water.

Small vessels and boats find sheltered anchorage between Tamposo islet and the shore.

LIGHT.—Babi island light, situated about 15 miles eastward of St. Nicolas point, may possibly be sighted by vessels passing through Sunda strait, when within 6 miles northward of that point. It is a *white fixed* light, which should be visible 13 miles, in clear weather, Lat. 5° 49′ S. Long. 106° 16¼′ E.

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

between the bearings of S. 81° E., through north, to N. 88° W. *See* Eastern Archipelago, Part II.*

Lat. 5° 54′ S. Long. 105° 56′ E.

Toppers (Button) island, about one cable in diameter, is 230 feet above high water, steep, and covered with trees. It lies well out in the fairway of Sunda strait, 5 miles, N.E. by E. $\frac{1}{8}$ E. from Thwartway island, and has 15 fathoms close off its south end, and from 30 to 40 fathoms at a short distance all round.

CHANNELS.—Between Thwartway and Zutphen islands the channel is 4 miles wide, with two dangers, viz., Stroom rocks off Thwartway, and Winsor rock off Toppers island. Owing to the great depth of water, 40 to 60 fathoms, it is not so convenient as the channel between Thwartway and Java, where the depths being only 20 to 30 fathoms, greater facility is afforded for anchoring in calms. The channel between Thwartway and Sumatra is much frequented in the westerly monsoon by vessels bound to the westward, being shorter although more contracted than the other channel between Thwartway and Java. The former may be adopted with a steady wind, for in such case, with the westerly current, a sailing vessel will get speedily through; but in light baffling winds, there is a danger of being drifted about by strong tides or currents near Stroom rocks, where the water is too deep for anchorage.

Lat. 5° 55½′ S. Long. 105° 49½′ E.

Stroom rocks, lying N.N.W. $\frac{5}{8}$ W., distant nearly 2 miles from the west point of Thwartway island, is a group of rocks with some heads just above high water. They are "steep-to," and at times the breakers over them may be seen at a considerable distance.

A rock is charted about half a mile south-east from Stroom rocks.

The currents or tidal streams in the vicinity of these dangers run strongly, and when opposed to the wind, cause such strong eddies as to make it almost appear as if Stroom rocks were connected with Thwartway island.

Winsor rock, marked by tide rips, has a least depth of 14 feet over it, with other rocks close-to, beyond which the depths increase suddenly to 20 or 30 fathoms in all directions. From the rock the summit of Toppers island bears S.E. by E. $\frac{5}{8}$ E., distant about $1\frac{1}{2}$ miles.

General Directions.—Steam vessels, and sailing vessels with a steady and commanding breeze, entering Sunda strait, from a position about 2 miles off Third point, may steer to pass about the same distance off Fourth point; thence westward of Brabands island, taking care not to borrow too close on Browers sand in passing, observing that Fourth point open westward of Brabands island bearing S.S.W. $\frac{7}{8}$ W., leads westward of it.

General chart, 1,653 [2,559].

* To be altered to *white occulting*, every *fifteen seconds*, showing light, *ten seconds*; eclipse, *five seconds*.

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The winds, however, frequently become light and variable, and a sailing vessel may be compelled to anchor, in which case it is better to keep well in with the coast of Java, avoiding the dangers in Peper bay, which should not be approached under a depth of 14 fathoms. Chart, 2,056 [2,545]. Var. 0° 25′ E.

When the stream is running to the westward in the middle of Sunda strait, an eddy will be experienced near the land; besides which a vessel may anchor anywhere along the shore, except near Fourth point, where the bottom is in places foul and rocky. When working to the north-eastward, therefore, it is advisable not to keep too far in the offing, in order to make the eddy available and retain favourable anchoring ground. For working to the westward, *see* page 435.

When northward of Toppers islands, if bound to Banka strait, steer for the fairway between the Two Brothers and the North Watcher; *directions continued on page* 453. If bound to Batavia, pass St. Nicolas point at the distance of 2 miles, and shape course E. ½ S. to pass midway between Babi island and Pontang point, and to the entrance of Inner or Dutch channel, the one most frequented by vessels entering Batavia road from the westward. *See* Eastern Archipelago, Part II.

SUNDA STRAIT.—NORTHERN SHORE.—The South Coast of Sumatra forms the north shore of Sunda strait, and between Flat cape on the west and Varkenshoek on the east, a distance of 70 miles, is indented by two large bays, named Semangka or Keizer, and Lampong, the shores of which are fronted by numerous islands and rocks.

FLAT CAPE (Vlakke Hoek) is the south-west extremity of Sumatra and of the district of Benkulen; the peninsula, of which it is the western extremity, separates Semangka bay, on the east side, from Belimbing bay on the west side. Its southern coast is low and wooded, and cape Rada, its east extreme, and the termination of the Sawah range of mountains, is distant 10 miles from Flat cape.

Approaching Flat point, in thick weather, when the land cannot be seen, the soundings will be a good guide, and it is not advisable to get into less depth than 20 fathoms.

A reef fringes the shore of Flat cape and thence to cape Rada, but at one mile distant there are depths of from 7 to 10 fathoms.

LIGHT.—From a sixteen-sided iron tower 215 feet in height, with a white dwelling, situated near the extremity of Flat cape, is exhibited, at an elevation of 205 feet above high water, a *white group flashing* light, with a period of system of *half a minute*, which shows thus:—Flash for *two seconds*; eclipse, *three seconds*; flash, *two seconds*; eclipse, *three seconds*; flash, *two seconds*, followed by an eclipse of *eighteen seconds*; in clear weather, it should be visible, between the bearings of S. 42° E. and N. 84° W. Lat. 5° 55½′ S. Long. 104° 33′ E.

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Chart, 2,056 [2,545]. Var. 0° 20′ E.

(except where obscured by Little Fortune island between the bearings of S. 73° E. and S. 76° E.), and from a distance of 21 miles.

Seleman rock.—Seleman point is situated 3 miles south-eastward of Flat cape, and Seleman rock, on which the sea breaks, is about half a cable in length in an east and west direction, has a less depth than 3 fathoms over it, and lies with Seleman point bearing W. by N. $\frac{3}{4}$ N., distant $1\frac{3}{4}$ miles, and about $1\frac{1}{2}$ miles from the shore.

Sandbank.—At about 3 miles south-westward of Flat cape there is a bank of reddish sand, about 2 miles in length and one mile in breadth, with depths of 8 to 9 fathoms over it. The depths seaward of this bank increase rapidly to 30 and 50 fathoms, and within it there are depths of 12 to 14 fathoms. At about 4 miles westward of Flat cape a doubtful bank of 5 fathoms is charted.

Plan, 2,761 [2,540]. Lat. 5° 54½′ S. Long. 104° 33½′ E.

BELIMBING BAY lies northward of Flat cape and is open to N.W. winds; a coral reef, dry at low water, extends for a distance of 3 cables from the south point of the bay, and the 5-fathoms contour line is 8 cables from this point in the same direction, with depths of $3\frac{1}{2}$ fathoms between. The 5-fathoms contour line is generally about 6 cables from the east side of the bay.

A shoal with $3\frac{3}{4}$ fathoms water over it, and depths of from 7 to 10 fathoms around, lies with the south point of the bay bearing S.S.E. $\frac{7}{8}$ E., distant nearly 2 miles; a patch which breaks occasionally lies with the same point bearing S.E. $\frac{7}{8}$ S. about 3 miles.

Water.—A well of good water lies within the south point of Belimbing bay, near a small village.

Anchorage.—Vessels may anchor in 6 fathoms water, and find a good berth with south-east winds about $1\frac{1}{4}$ miles northward of the village. Small vessels will be fairly sheltered from most winds by anchoring in 5 fathoms water, over sand, with the lighthouse bearing S. by W. $\frac{1}{4}$ W., and the south point of Little Fortune island W. $\frac{1}{8}$ S.

Lat. 5° 54′ S. Long. 104° 20½′ E.

Little Fortune island, or Batu Kechil, lies W. by N. $\frac{1}{4}$ N., distant $6\frac{1}{2}$ miles from Flat cape lighthouse, and about 5 miles from the coast of Sumatra; it is low, wooded, one mile in diameter, and surrounded by a reef; breakers extend for a considerable distance from the south-east point.

Anchorage.—There is anchorage off the east side of Little Fortune island in from 9 to 10 fathoms water.

SEMANGKA or KEIZER BAY, on the eastern side of Bengkulen peninsula, extends in a north-westerly direction about 30 miles, and at its entrance is about 20 miles wide.

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The western shore of the bay affords no shelter from south-easterly winds, and has from 20 to 30 fathoms water within half a mile of it; the eastern side, north-westward of Kalambayang harbour, is not so steep, and affords good anchorage about 2 miles off, in 20 or 30 fathoms; but is also exposed to south-easterly winds. Chart, 2,056 [2,545]. Var. 0° 25′ E.

Mountains.—The Sawah mountains, which terminate in cape Raja, are parallel to, and about 3 miles distant from, the western side of the bay, and on the eastern side are several high mountains, namely, the Keizerspiek or mount Tangkamus situated at its head, 7,480 feet; mount Pesawaren, 19 miles east-south-eastward of Keizerspiek, 7,480 feet; and mount Tangka, 3,419 feet above high water, the latter being situated eastward of Kalambayang. Lat. 5° 25¾′ S. Long. 104° 40½′ E.

Tamping bay, about 3 miles to the northward of cape Rada, is an open bight, with good holding ground in depths from 10 to 15 fathoms, one mile off shore, but exposed to south-easterly winds.

Water may be obtained from the shallow rivulets that discharge into the bay, but with some difficulty, on account of the rocky shore.

Anchorage.—Good anchorage may be obtained in 12 fathoms water, over mud, 7 cables from the shore, with the north point of the bay bearing N. $\frac{7}{8}$ E., and the village N.W. by W. $\frac{1}{8}$ W.

Tabúan island, lying nearly in the middle of the entrance of Semangka bay, is high and "steep-to" all around, beyond a short distance, except its north extreme, which is foul to the distance of about 3 cables.

Water.—There is fresh water on the island, but the high surf usually renders landing difficult.

Anchorage.—The only anchorage is on the north-east side in from 25 to 30 fathoms water, over sand, very near the shore; it is a very indifferent one in the westerly monsoon.

Villages.—Between Tamping bay and Tanjong Waringin are several villages, viz.:—Muara Tanda, Auer Gading, Tiram, Karang Berak, and Wai Nipah.

Tanjong Waringin village lies in the north-west part of Semangka bay, at the mouth of Semangka river, the water of which is good, but boats will find it difficult to enter; the village lies near the beach, on the south side of the river. The land is low, and marshy near the sea. Lat. 5° 33′ S. Long. 104° 32½′ E.

Near Botong point, the southern extremity of the bay near Tanjong Waringin, there is a rocky ledge which projects about one mile, with a depth of 10 fathoms near it.

Anchorage.—The best anchorage is eastward of the mouth of the rivulet, in 14 fathoms water, with the village bearing S.W. by W.

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

about one mile distant from the shore. Vessels lie here usually without danger from south-easterly winds, which seldom throw a very high swell so far up the bay.

COAST.—From Tanjong Waringin, the coast, low, and wooded with high trees, turns to the north-eastward for 6½ miles to Kota Agung (New), which is the chief village of the Semangka district; a coast reef fringes this part of the coast, and on it, near the point where the village is situated, there is a rock above water.

Kota Agung (Old) lies 2 miles eastward of Kota Agung (New), and the coast here is fringed by a reef which always breaks.

Anchorages.—Off the village of Kota Agung (New) anchorage may be obtained in 10 fathoms water, over mud, with the village bearing N. by E. ½ E., 8 cables from the shore. The anchorage off Kota Agung (Old) is in 21 fathoms water, over mud, with that village bearing N. by E. ½ E., distant 9 cables from the shore.

Coast.—The whole of the east coast from this point to Kalambayang harbour, 27 miles south-eastward, is low and backed by high land, and generally fringed by a small coral reef. On this coast are the villages of Padang Ratu, Pati, Pertibi, Paku, and Pekon Dalam.

Plan, 2,056 [2,545]. Lat. 5° 44½′ S. Long. 105° 2½′ E.

Kalambayang harbour, on the eastern side of the Semangka bay, is about three-quarters of a mile in extent, safe, and affords good shelter from all winds, with sufficient depths for all vessels. There are depths of 13 fathoms over mud, in the centre of the harbour, and from 8 to 10 fathoms about 2 cables off shore. The entrance may be easily recognised by Iyu island, high and rocky, which lies about a mile to the southward, and can be seen, in clear weather, about 15 miles. Half a mile north-westward of Iyu island lies Kelapa island, the channel between having a depth of 25 fathoms.

Supplies.—Water may be obtained from a stream in the north-eastern part of the bay, whence there is a road leading to the village, which is situated in a valley, about three-quarters of a mile from the landing place, and where probably supplies may be obtained.

Directions.—In the north-west monsoon, sailing vessels should enter the harbour by the western passage, between Kelapa island and Napal point; and when the latter bears about West, anchor near the eastern beach in 10 fathoms water, over mud, or anywhere in the harbour, there being no hidden dangers.

In the south-east monsoon, steer in between Iyu and Kelapa islands. With a commanding breeze a sailing vessel may pass eastward of Iyu, between it and Vogel or Bird island, or between the latter island and the

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mainland, but this channel is narrow. Rover rocks, off South point, being mostly above water, are easily avoided by passing westward of them. Plan, 2,056 [2,545]. Var. 0° 25′ E.

Kiloang harbour, 4 miles south-eastward of Kalambayang harbour, also affords safe anchorage. It may be known by Tonkali island, which is visible 12 miles in clear weather, and lies off the south-east point of the harbour, being separated from the mainland by a passage for small vessels, in which the depth is 16 fathoms. Plan, 2,056 [2,545].

Kiloang island, small, and not very high, lies within Tonkali island, with some rocks at its northern and southern extremes, a large reef to the westward, and a smaller one on its eastern side. Black rocks, above water, are situated west-south-westward of the island. In the bight north-eastward of Kiloang island the depths are 4 and 5 fathoms in the entrance, and a high swell sometimes breaks there; eastward of this there is apparently anchorage in 11 or 12 fathoms, but caution is necessary in making use of this inner portion, which is but little known. The anchorage under Kiloang island should be taken. Lat. 5° 47½′ S. Long. 105° 5½′ E.

Water may be obtained from a small rivulet on the north-east side of the bay.

Directions.—To enter Kiloang harbour, approach Tonkali till it bears East, distant 2 or 3 cables, when the Black rocks, consisting of three groups, will be seen, the south-westernmost of which bears N.N.W. from Tonkali. Steer about E.N.E. between the island and rocks southward of Kiloang island, in from 30 to 20 fathoms, for the eastern side of the harbour, which is very high; when the centre of Kiloang island bears West, good anchorage may be taken in 13 fathoms water, over sand, sheltered from all winds.

Sailing vessels may leave with the land wind which blows here from the northward, but it is recommended to have a boat in attendance to tow, lest they should get becalmed under the high land. Although the bay outside Kiloang harbour is spacious, it is advisable to pass close to the westward of Tonkali island.

COAST. — From Kiloang harbour the coast takes an easterly direction for about 8 miles to Tikus point, the west extreme of Lampong bay. The Tuju islets lie about half a mile off shore at 2 miles eastward of Tongkali island, and there are other rocks near the coast farther eastward. Chart, 2,056 [2,545].

Batu Belantung, a rock awash and on which the sea generally breaks, lies about a quarter of a mile off shore and three-quarters of a mile south-west from the west point of Peper bay; it is connected with the islet north of it by a ridge. Lat. 5° 48½′ S. Long. 105° 11½′ E.

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

Peper bay, on the west side of Tikus point, is about three-quarters of a mile across, and has a large three-pointed rock in the middle and a small island on the east side. The water is deep, and country vessels anchor close to the shore in 18 fathoms water, eastward of the rocks.

LAMPONG BAY, between Tikus point on the west and Kelapa point on the east, is about 23 miles wide, and extends nearly the same distance in a northerly direction. Several islands lie along the western shore of the bay, forming sheltered anchorages between them and the mainland. In the entrance will be found depths of about 20 fathoms over clay bottom, and within from 10 to 15 fathoms over mud.*

The eastern side of Lampong bay, between Telok Betung and Chondong islands, is high, free from danger, and has depths of from 14 to 15 fathoms, close-to. From Chondong islands to Kelapa point the coast, at 2 or 3 cables distance, is fronted by a line of rocks, on which the surf breaks heavily with westerly winds, and renders landing difficult.

Lat. 5° 39′ S. Long. 105° 15¾ E.

Outlying dangers.—Outside the islands on the western shore of the bay, there is a sandbank, dry at low water, surrounded by a reef, which rises from a depth of 17 fathoms, over mud, and bears S.E. by E., distant 1½ miles from Kalagian island.

On the eastern side of the bay a reef, with 1½ fathoms water over it, lies S.E. by S., distant 1¼ miles from the easternmost Chondong island.

Pedada bay, the first bay to the northward of Tikus point, is 1½ miles wide at its entrance and 3½ miles deep.

When steering into the centre of this bay in the direction of mount Tangka, the depths will be from 20 to 15 fathoms, over clay and mud, and Pedada, Penarian, and Lalanga, three small islands, will be seen; Pedada is the south-easternmost and highest of these.

Dangers.—The bay is fringed by a small coral reef, and two rocks lie north-westward of the south point.

About 2 cables northward of Pedada there is a large coral reef, and W. by N. of the reef and eastward of the opening between Penarian and Lalanga islands lie two reefs which are almost always breaking.

In the northern part of the bay and W. by S., distant about three-quarters of a mile from its northern entrance point, lies a large reef, with a small one, W.N.W., about the same distance from it and near the coast.

Anchorage.—Steering in between these two reefs on each side of the bay, anchorage may be obtained in 15 fathoms water near Pedada village, with the west point of Pedada island bearing South.

* Telok Betung, at the head of Lampong bay, was destroyed by the earthquake in 1883. It is probable that parts of the bay may have altered, and therefore the information relative to it must be used with caution.

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Pedada village is to the westward of Lalanga island, and stands on a clear, fresh-water stream. Chart, 2,056 [2,545]. Var. 0° 25′ E.

Kelapa, a small islet, high, rocky and surrounded by a coral reef, is connected with Pedada point, the north extreme of the bay, by three groups of rocks above water, with a passage for small craft between each of them. North-eastward of Kelapa lie three groups of rocks, with 16 fathoms water, over clay, between them and the island; to avoid them keep Setenga island bearing to the westward of North. This small island is also high, with a reef extending about 2 cables from its north-east point. Lat. 5° 44′ S. Long. 105° 13¾′ E

Puhawang island, the largest island in Lampong bay, situated 2 miles northward of Pedada point, is 2½ miles in length in a north-north-east and south-south-west direction, and 2 miles in breadth; it is high and has a peak on its north-east side. A coral reef surrounds this island extending 2 cables off from the south and west sides and 4 cables from the north-east part.

Little Puhawang, a small island, lies close off its eastern point and is surrounded by a coral reef, which on its west side connects with that of the larger island.

Dangers.—South-westward of Little Puhawang, and near the coast of Puhawang island, there are three small reefs, the outer of which lies S.W. by S., distant about 7 cables from the east point of the former island.

A sandbank, dry at low water, and surrounded by a reef, which extends 2 cables from it in a southerly direction, lies N.E. by N., distant 2 miles from Little Puhawang and has depths of from 12 to 17 fathoms close to.

The east point of Tegal island, bearing nothing eastward of North, clears it, passing to the eastward.

Pundu bay, lying about 4 miles to the northward of Pedada bay, and westward of Puhawang island, is 3 miles in length by 2 miles in breadth, with depths of from 7 to 10 fathoms.

Dangers.—Four small coral reefs lie, in a general north and south direction, off the east side of Pedada point; the outer, with 2 fathoms water over it, is 5 cables from the coast; they all show discoloured water.

A reef lies S.S.E. ⅛ E. distant about 8 cables from Pundu point, and N.E. by E. distant 4 cables from the same point a small bank has 2 fathoms water over it.

The following reefs, awash, are situated in the bay:—A large coral reef lies S.W. ½ S. about 6 cables from Badung point, the north point of the bay, and a short distance south-west of this reef there is another still larger.

North-eastward of these, between them and Badung point, there is a small reef near the shore.

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

Two small reefs lie in the south-west point of the bay.

A small reef is situated close to the north-west point of Puhawang island, and a coral reef lies 4 cables south-eastward of Badung point.

Anchorage may be obtained in from 7 to 8 fathoms water with Pundu village bearing W. $\frac{1}{8}$ S. and Pundu point S.E. $\frac{1}{8}$ E.

Directions.—Pundu bay may be approached on either side of Puhawang island. When taking the northern passage, which is preferable, the white coral reefs lying about $1\frac{1}{2}$ miles north-east of Puhawang island are seen at some distance. The channel, between Puhawang island and the sandbank already mentioned, has depths of from 16 to 17 fathoms, while that to the northward, between the sandbank and Kalagian island, has from 14 to 15 fathoms water; in the latter channel, it is necessary to keep nearer the sandbank to avoid the reef southward of that island hereafter described.

Pass in mid-channel between Puhawang and Kalagian islands; southward of the reef lying south-east of Badung point, and giving the reef off the north-west point of Puhawang island a berth, steer to leave the three reefs lying south-westward of Badung point on the starboard hand to the anchorage.

Entering by the channel southward of Puhawang island:—Keep Setenga island bearing southward of S.E., astern, to avoid the coral reefs projecting from the south side of the bay and passing not more than half a mile distant from the south shore of Puhawang island, in not less than 9 fathoms water; steer for Pundu point, bearing N.W., till the south point of Puhawang island bears East, when alter course more to the northward, along the coast of the island, to avoid the reef lying 4 cables north-eastward of Pundu point, and when Pundu point bears S.W. steer W. by N. to the anchorage.

Lat. 5° 37½′ S. Long. 105° 14′ E.

Kalagian island, one mile northward of Puhawang island, is high, 2 miles in length in an east-south-east and west-north-west direction, and surrounded by a coral reef, which extends about a cable from the north side; on the south side there is a small island.

Reef.—Half a mile S. by E., from the south-east point, of Kalagian and east-south-east of the small island, there is a coral reef on which, at low water, a black rock shows.

Ratai bay, just north of Pundu bay and north-west of Kalagian island, is 3 miles in extent, with depths of from 8 to 13 fathoms, over mud bottom. Sabu, Ratai and Penjindongan villages are situated near the head of the bay, and Menango village on the north side.

A broad mud-bank occupies the head of the bay extending about half a mile off shore, and three streams enter the western part of the bay.

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Dangers.—North-westward of Kalagian island are two coral reefs which lie in a north-north-west and east-south-east direction from one another; the southern reef has a rock above water, and they both dry at low water. Between the reefs and the island there are depths of from 10 to 11 fathoms and between themselves 9 to 11 fathoms. Chart, 2,056 [2,545]. Var. 0° 25′ E.

Directions.—The bay may be entered on either side of Kalagian island; the northern channel is free from danger, but in the southern, the sandbank and reefs southward of Kalagian island, the reef near Badung point and the reefs north-westward of Kalagian island, must be avoided.

Mahitam island, small, low and surrounded by a coral reef, lies off Menango point, the north point of Ratai bay, with which it is connected by a reef; there are three hills on the northern part of the island. Lat. 5° 36′ S. Long. 105° 14½′ E.

Anchorage.—There is a good anchorage on its north side in 13 fathoms water, over mud.

Tegal island, about 1½ miles north-eastward from Mahitam island, is flat-topped and conspicuous; it is about a mile in diameter, surrounded by a small coral reef, and, being seen from all parts of the bay, forms a useful mark. Coming from the eastward, a vessel may steer for Tegal island on a N.W. bearing, and pass it in a depth of 15 fathoms; entering from the southward and from Lagundi strait, it is also a useful mark.

Dangers.—Four reefs lie between the island and the western shore; between these reefs and the island there is a small passage in which the depth is 15 fathoms, over mud.

Ringang bay.—Lahu point, the south entrance point of Ringang bay, is 3 miles from Menango point, and has an island, of the same name, lying off it from which a reef extends 3 cables to the northward and also connects the island with the shore. Tabikel point, on the north side of the bay, has a small island of the same name lying on the shore off it. The bay is about 1½ miles deep, with depths of from 9 to 11 fathoms, over mud.

Ringang, Horon and Lampasing villages are near the shores of the bay; at the first there is a small stream with a reef off its mouth.

Tankil island lies 3 cables north-eastward of Tabikel island, and is about 4 cables in length in a north-north-west and south-south-east direction, with a breadth of 2 cables. Its north side is low, but the south is high; and from its eastern point a reef stretches off 2 or 3 cables, showing, at low water, some black rocks, which may be passed in from 9 to 14 fathoms water. There is a narrow channel westward of the island with 11 to 12 fathoms water, over mud. Chart, 940 [2,547] Lat. 5° 31′ S. Long. 105° 16½′ E.

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Chart 940 [2,517]. Var. 0° 25′ E.

The head of Lampong bay, northward of Tankil island, is about 4 miles wide, and in the western part, which, for nearly 1½ miles from the shore, is encumbered with reefs and sandbanks, there are three islands, Kobur, Pamagotang, and Pasarang.

Kobur island, about a cable in diameter, is encircled by a coral reef which extends 2 cables from the east side: it lies N.N.W. ⅛ W., distant 1 4/10 miles from the north point of Tankil island.

To the southward of Kobur island lies a large reef on which there is a bank that dries at low water, and between Kobur and Tankil islands a mud bank extends a third of a mile from the coast.

Lat. 5° 58¾′ S. Long. 105° 16½′ E.

Pamagotang, a low island about half a cable in length with some trees on it, lies N. ½ W. nearly 2 miles from the east point of Tankil island; it is surrounded by a coral reef, close to the island on the north and north-east sides, but extending 2 cables from the west and 3 cables from the south sides; a bank, dry at low water, lies on this reef. A detached reef, with 1½ fathoms water over it, lies nearly 4 cables south-eastward of the island, and northward of the island, distant 2 cables, is the south extreme of a reef which, with about 2 feet water over it and a patch, drying at low water, on its north-east side, extends about 3 cables in a north-east direction. Several reefs lie westward of this.

Pasarang island, lying 8 cables north-north-westward of Pamagotang, is low and 3 cables in length in a north-north-west and south-south-east direction; a bank, dry at low water, lies 3 cables from the south-east point of the island, and eastward of it are two reefs, with 4 and 3 feet over them respectively, the eastern being situated E. ⅞ S., distant 6 cables from the south point of Pasarang island.

LIGHT BUOY.—A conical buoy, painted black and moored on the north-east side of the eastern reef, from Pasarang island, exhibits a *white occulting* light, with a period of system of *twenty seconds*, showing light for *ten seconds* followed by an eclipse of *ten seconds* duration.

Apen hill, sugar-loaf shaped and 290 feet above high water, s situated on the north side of the roadstead close to the water, and serves as a mark.

A mud bank, dry at low water, fronts the shore of Telok Betung and from about a cable off shore at Apen hill, gradually widens till between Telok Betung and Pasarang island, where it extends off about half a mile. Several shoal patches lie 3½ cables off shore, southward of Apen hill, the least water on them being 4 feet.

TELOK BETUNG lies at the head of Lampong bay, and is the chief seat of Government and place of trade for the Lampong district,

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comprising the southern portion of Sumatra and off-lying islands. The population of the district in 1900 amounted to 15,232, of which 101 were Europeans. Telok Betung in the same year had 2,871 inhabitants, of which 41 were Europeans.* Chart, 940 [2,547]. Var. 0° 25′ E.

LIGHT.—A *white flashing* light every *three seconds* thus :—light *one second*, eclipse *two seconds*, is exhibited at an elevation of 48 feet above high water, from an iron frame, 46 feet in height and painted white, which stands on the beach, about 440 yards north-eastward of the new pier ; it should be visible, in clear weather, from a distance of 12 miles. Lat. 5° 26¾ Long. 105°

Communication.—The Royal Netherlands Packet Company's steamers, running between Padang and Batavia, call fortnightly; Telok Betung is also connected with Batavia by telegraph. (*See* page 21.)

Piers.—There are two piers, one built of stone.

Anchorage.—The usual anchorage is in depths of 6½ to 7 fathoms, south-south-eastward of the lighthouse.

There appears to be good shelter for small craft, south-westward of Pasarang island, in about 3 fathoms water.

Directions.—When bound to Telok Betung, after passing eastward of Tegal, be careful not to bring its east point to bear to the eastward of South, in order to pass eastward of Pamagotang and the adjacent dangers. When the south point of Pasarang bears West, and not less than 8 cables distant, the vessel should be abreast the light buoy marking the edge of the reef extending 6 cables eastward from Pasarang, and may steer N.N.W. for the lighthouse.

Tides.—It is high water, full and change, at Telok Betung at 9 hours ; springs rise about 3 feet.

Panjang harbour and river.—The coast eastward of Telok Betung turns to the south-eastward and is high, with scattered villages, and fronted by a steep coral reef; Panjang harbour, about 2 miles south-eastward, is formed by a sand spit extending three-quarters of a mile northward from the point southward of the river of the same name. This harbour, shown on Admiralty plan, No. 940, is not mentioned in the latest Dutch Sailing directions, and is therefore presumably closed.

CHONDONG ISLANDS are three in number, of which the northernmost is a steep rock ; the two others are larger, but not so high. Between them are narrow passages, with 12 fathoms water ; and between them and the coast the depths are from 10 to 14 fathoms, over mud. Lat. 5° 33′ S. Long. 105° 21′ E.

Dangers.—From the south point of the eastern island a reef extends for a distance of 4 cables, and half a mile eastward of the south point of the same island there is a small coral reef about one cable square, with one fathom least water over it.

General chart, 2,761 [2,540].

* *See* footnote on page 420.

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

Two reefs, with 1¼ fathoms least water over them, and 4 cables in length in a north-north-east and south-south-west direction, lie one mile south-east of the above island.

Coast.—From Chondong islands the coast trends in a S.E. by S. direction for 5 miles to Selakie point, and then turns S.E. by E. for 8 miles to Belantung point; it is high, and fringed by a coral reef about 3 cables in breadth which breaks with westerly winds, and at one mile from the coast there are depths of 11 and 12 fathoms.

Kraanvogel or Crane island, 9 miles south-eastward from Chondong islands, and connected to the shore by a coral reef, with 9 fathoms close-to, is difficult to discern, as it lies close to the high land, and consists only of a single rock; just to the eastward of it, however, there are some white limestone rocks on the shore.

Lubuk or Belantung bay, eastward of Belantung point, is about 1½ miles deep with depths of 10 and 11 fathoms at the entrance and 4 to 5 fathoms inside, over muddy bottom. The points of the bay on each side are fringed with rocks on which there is usually a high surf. A rock dry at low water, and on which the sea generally breaks, lies 1½ cables off Belantung point.

Belantung and Lubuk villages stand on the shores of the bay; at the latter a fresh water stream discharges.

Lat. 5° 44′ S. Long. 105° 35½′ E.

Kalianda road, about 3 miles south-eastward of Masim point, the south side of Lubuk bay, has the village of the same named fronted by a white sandy beach, with rocks above water off it, between which there are channels affording easy access to the shore; a small river flows into the sea, and there are warm springs near the village.

Dangers.—A rock, showing at low water, spring tides, lies about 3 cables from the shore, with the flagstaff bearing E. by S. ½ S., and close to the eastward of it there are two others with depths of 3 and 4 feet over them.

Submarine telegraph cable.—A telegraph cable connects Kalianda with Java.

The anchorage is in 8 fathoms water, over mud, to the northward of these rocks, with the village bearing about East, distant one mile. Vessels are prohibited from anchoring near the cable, which lies in a W.N.W. direction from a beacon with triangle and of the cable house at Kalianda.

COAST.—From Kalianda road the coast has a southerly direction for 4½ miles, and then turns south-eastward for 2 miles to Kelapa point. A coral reef, with here and there rocks above water, fringes this coast, and

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there are several villages along it; but with westerly winds the breakers on the coast reef render landing dangerous. Chart, 2,056 [2,545]. Var. 0° 25′ E.

Water may be obtained at Chanti village, situated 4 miles southward of Kalianda; the best watering place is north of the village.

Anchorage may be obtained in 8 fathoms water, over blue mud, with the point, southward of Chanti, bearing S.E. $\frac{1}{8}$ S. and the south-eastern Tiga islets S.W. by W.

Raja Basa Road.—The land forming the south-eastern part of Lampong bay is high, and rises to two conspicuous peaks 3 or 4 miles inland, named Raja Basa mountains; the height of the north-west peak, which shows as a saddle from some directions, is 4,235 feet, and that of the south-east peak, rounded in form, 3,920 feet above high water. Lat. 5° 46½′ S. Long. 105° 38′ E.

Raja Basa village is just to the northward of Kelapa point, and Katimbang village about a mile further northward of Raja Basa. Watering is much more difficult than at Chanti, and the landing dangerous with westerly winds, as the coast is always covered with high breakers.

Anchorage.—The anchorage in Raja Basa road is one mile from the shore in 9 fathoms water, over mud, with the village bearing E.N.E., Tiga islands W. $\frac{1}{4}$ N., and Kelapa point S.E. by E. $\frac{1}{8}$ E. The bank in some places projects to the distance of half a mile, having 7 fathoms close to.

COAST.—Kelapa point, the south-east point of Raja Basa road, is low, and covered with cocoa-nut trees. From Kelapa point the coast trends to the eastward for 6 miles, then turns to the southward for 3½ miles to Varkenshoek; the reefs fringing it may be approached to depths of 8 to 9 fathoms, and at the bottom of this bight are Menkodo and Sekapal, two small islands surrounded by reefs. Lat. 5° 50′ S. Long. 105° 36¾′ E.

Menkodo, about 3 cables in length in a north-north-east and south-south-west direction, and one cable in breadth, has two summits, about 65 feet above high water. Sekapal, situated 2 cables from the coast, is highest at its southern part. Small vessels pass between these islands and the coast.

On the mainland abreast is a village near a river, off which small craft find shelter behind a projecting point. The depths throughout the bight are from 15 to 23 fathoms, decreasing near the shore to 8 and 10 fathoms.

Tims or Collier rock, about 6 feet above high water, 33 yards in extent, and "steep-to," lies N.W. $\frac{3}{8}$ W., distant 1½ miles from Varkenshoek, and about one mile off shore; it may be seen from a distance of 3 miles.

OFF-LYING ISLANDS.—LAGUNDI ISLANDS, lying in the south-west approach to Lampong bay, and between 2 and

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Chart, 2,056 [2,545]. Var. 0° 25′ E.

10 miles eastward of Tikus point, consist of seven thickly wooded and uninhabited islands, viz., Lagundi, Rond, Saka, Sunchal, Mangoman, Sasarat, and Tims; deer, wild hogs, and good timber may be obtained. Along the southern coasts of the first four islands, depths of from 40 to 50 fathoms, over hard bottom, are found; close in to, and near, Tims island, 27 fathoms. In the north-westerly monsoon the sea breaks with great violence on the south side of the islands, but on their northern side boats can generally land, the depths close to being from 15 to 20 fathoms, over clay.

Lagundi, the largest island of the group, is about 4 miles in length in an east-north-east and west-south-west direction, and is, except on its south side, fringed by a small reef; close to the southward of its west point are two high, round-shaped rocks covered with verdure, with a boat channel between them. On the south-east side of Lagundi there is another rock or islet of the same character.

Lat. 5° 48½′ S. Long. 105° 17′ E.

Nangga bay, on the north side of Lagundi island, is small, but safe, with depths of 9 to 15 fathoms, over clay. In the middle of the entrance is Patapan, a small island, surrounded by a coral reef which extends 1¼ cables from its north-east side, behind which a small vessel may find good shelter from wind and sea.

Mangoman island, lying half a mile northward of Patapan island, has depths of from 15 to 22 fathoms, over clay, all round, except on its eastern side, where the depths are 10 to 15 fathoms; it has a small reef off its north-east side, and some rocks above water off its south-west point.

Dangers.—A reef, with a depth of one fathom over it, lies 4 cables N. by W. from Patapan island; it shows discoloured water.

One cable to the northward of the preceding is a small reef with 2½ fathoms water over it, and 2 cables southward of this is another small reef on which the depth is 3½ fathoms.

Water.—In the southern part of the bay a small rivulet of good water runs through a grassy flat.

Directions.—The safest channel into the bay appears to be between the small coast reef extending eastward of Mangoman island and Lagundi island, the depths being from 16 to 17 fathoms.

LAGUNDI STRAIT, between Lagundi islands and the mainland to the westward, is 2 miles wide, and may be recommended to sailing vessels working out of Lampong bay in the westerly monsoon. About mid-channel is Sasasat island, which is high, with 10 fathoms water over sand, close-to on the eastern side, and from 25 to 30 fathoms around; on its

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north-east side is a small reef, and off its south-west point some high rocks. The passages on either side of Sasasat are equally good, and with adverse winds, or currents, good anchorage may be obtained to the eastward of that island, in 10 or 12 fathoms water. Chart, 2,056 [2,545]. Var. 0° 25′ E.

Reef.—A coral reef, with 2 fathoms water over, and 13 fathoms around, it, lies northward of Mangoman island, with the highest point of Sasarat bearing S.W. by W., distant nearly 4 miles, and the middle of Mangoman S. ½ E. The reef is about 75 yards in length, and cannot be distinguished by discoloured water.

When the passage between Rond island and the east end of Lagundi is open, bearing about S.E. ¼ S., a vessel will be north-eastward of the reef. The highest point of Lagundi in line with the west point of Lagundi harbour, leads well to the south-westward.

Rond island, off the east end of Lagundi, is 3 miles in length, in a north-west and south-east direction, and nearly one mile in breadth; except on the south side it is fringed by a small reef, and off its south-east point lie some rocks above water.

Saka lies about one-third of a mile off the south-west point of Rond island, and is high and steep; 7 cables south-east of the island is a rock which covers at high water, and always breaks. Lat. 5° 49¾′ S. Long. 105° 19′ E.

Sunchal, low on its northern side, is situated eastward of the south point of Rond island, and is about three-quarters of a mile in length in a N. by W. and S. by E. direction. Except on its south side, where there are some rocks above water, it is surrounded by a reef.

Channels.—The depths between Lagundi and Rond island are from 9 to 14 fathoms, over hard ground, but a strong current runs there at times. Lagundi Tua, some high rocks and a grotto, lie in the middle of the channel and are connected to Lagundi island. Saka has 20 or 30 fathoms close-to; but in the channel between it and Rond island there are some detached rocks. This passage, which has depths of from 16 to 19 fathoms, cannot be recommended, nor that between Rond island and Sunchal, for although the water is everywhere deep, the ground is uneven and the current strong.

Tims island, lying 3 miles eastward of Sunchal, is small, low, consists chiefly of red clay, and is here and there wooded; it is surrounded by a broad reef with heavy breakers; the channels on either side of it into Lampong bay are clear.

KRAKATOA ISLAND, an active volcano, lying in the middle of Sunda strait, was, before the earthquake in 1883, about 5 miles in length, in a north-north-west and opposite direction, and 3 miles in

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Chart, 2,056 [2,545]. Var. 0° 20′ E.

breadth. That portion of the island northward of the highest peak was completely destroyed by the upheaval, and the scattered fragments form numerous banks in Sebesi channel. The island is now about 3 miles in length, east and west, by 2 miles in breadth; and from the peak, which is 2,657 feet above high water, the north side of the island is a perpendicular cliff, forming part of the arc of the crater, which lies between it and Verlaten island. No bottom was found at 155 fathoms, about 1½ miles north-westward of the peak, and where the larger portion of Krakatoa formerly stood. Except on the northern side, a reef fringes the island, and at the west point it extends for a distance of a mile with an islet and rock above water lying on it.

The changes in the locality, resulting from the eruption, are partly defined by surveys executed by the Netherlands Government surveying vessel *Hydrograaf*, 1883–85, but it is advisable to take every precaution when navigating near the shore or coming to an anchor.

Lat. 6° 14½′ S. Long. 105° 21¾′ E.

The reported site of Hudek rock is retained on the chart, 7 miles S.W. ⅝ S. of the peak of Krakatoa, but its existence is doubtful.

Tides.—It is high water, full and change, at Krakatoa island at 7 hours; springs rise 4 feet.

Verlaten island, lying north-west 2½ miles from Krakatoa, which is nearly three times larger in area than formerly, is 673 feet above high water, and about 3 miles in length in a north-east and south-west direction, by one mile in breadth. It is also an active volcano, and separated from Krakatoa by a channel with depths of from 100 to 140 fathoms. The whole island is surrounded by a broad reef with rocks above water lying on it, which from the northern side extends for a distance of 1½ miles, and about one mile from the east point lies a bank under water.

Lang island, 443 feet above high water, about 1½ miles in length, in a north and south direction, and half a mile in breadth, is separated from the north-east side of Krakatoa by a channel nearly 1½ miles wide; a reef borders its western side, extending for a distance of about 3 cables. This island does not appear to have altered very much, but the channel formerly between it and Krakatoa was only 2 cables wide.

Dangers.—Near the north point of the island lie some small rocks above water, and about half a mile northward of it there is a shoal with 2¼ fathoms water over it.

Bootsmans rock, 7 cables westward of the south point of the island, rises perpendicularly from a great depth to 17 feet above high water.

Krakatoa channel, between Krakatoa and Lang island, is about 1½ miles wide, and with deep water. As reefs extend from Krakatoa and Verlaten islands, great caution is necessary, and the passage should only be used by steam vessels.

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Sebesi or Tamarind island, lying 10 miles, N. by E. ½ E. from Krakatoa peak, is circular and nearly 3 miles in diameter. It has two peaks, which rise abruptly from the southern extremity of the island, and slope gently down to the northward; the higher is 2,818 feet above high water. Off the east side, at the distance of about half a mile, there are three islets named Husband, Little Tamarind, and Gorts, each surrounded by a reef with banks between them; a reef extends about a third of a mile off the north-east side of Sebesi. Chart, 2,056 [2,545]. Lat. 5° 57′ S. Long. 105° 29′ E. Var. 0° 20′ E.

Sebesi island produces a certain quantity of pepper. The village is on the east side, opposite Little Tamarind island.

Anchorage.—There is good anchorage around this island, in 15 to 25 fathoms water, except on its south side; and at one mile from the north-east side there is an excellent roadstead, even in south-west gales, with 13 fathoms water.

SEBESI CHANNEL, between Verlaten and Sebesi, is 8 miles wide, obstructed by reefs and banks of mud and pumice thrown out from Krakatoa, and should on no account be used. The centre of the channel is occupied by an extensive flat, 8 miles long, in a north-west and south-east direction, which has on it two reefs, named Steers and Calmeyer, almost awash, and composed of mud and pumice; their configuration is continually altering, and they are stated to be gradually subsiding.

Rocks.—On the southern side of the flat are detached heads with 3 and 4 fathoms water over them, and the channel between Sebesi and Steers reef is partly blocked by Boom rock, a few feet above water, which lies about half a mile southward of Sebesi, also by Hindostan rock, which has a depth of 1¾ fathoms over it; it is about 6 cables in length in a N.W. by W. and S.E. by E. direction, and lies 1½ miles from Sebesi. Between these rocks there are depths of from 10 to 15 fathoms.

Calmeyer reef lies 7 miles north-eastward, and Steers reef, 8 miles N. by E. from Krakatoa peak. Depths of less than 3 fathoms extend 2 miles southward from Calmeyer, and 3 miles south-westward and north-westward of Steers reef; the 2¼ fathoms patch, about half a mile northward of Lang island, has been already mentioned.

Sea rocks, situated 5½ miles W. by S. from the south-west side of Sebesi, consist of two pyramidal rocks, "steep-to," and inaccessible. The southern and larger, about 30 feet above high water, is named Gap rock, on account of a cleft in it; they are connected by a reef, upon which the sea continually breaks. The depths round the rocks are from 7 to 14 fathoms, and south-south-east of them, distant about half a mile and 1¼ miles, are two Lat. 5° 58¼′ S. Long. 105° 22½′ E.

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Chart, 2,056 [2,545]. Var. 0° 30′ E.

patches with 5 and 4 fathoms water over them respectively. Other dangers not charted may exist in this neighbourhood.

SEBUKU ISLAND, 1,398 feet above high water, lies 1½ miles northward of Sebesi island, and consists mostly of craggy hills. Its extent is 3½ miles in a north and south direction, and about 2½ miles east and west. The inhabitants cultivate pepper.

Reefs and ledges project from the numerous points of Sebuku, but they do not seem to extend far off, except from the west point, from which Sebuku reef stretches off 1½ miles; this reef is "steep-to," but not dangerous, because the westernmost rock on it rises to a considerable height above high water, and has a slight resemblance to Sea rocks.

Close to the east side of Sebuku is Beschutter or Shelter islet, which is 465 feet above high water on the east side, has a reef on its south side, on which lies a dry bank.

Northward of Beschutter island lies a coral bank above water, surrounded by a steep coral reef close to which there is a depth of 18 fathoms, over clay.

Anchorage.—Between Beschutter island and Sebuku there is good anchorage, for small vessels, in from 15 to 18 fathoms water, over clay, and there is a good road for large vessels in 11 to 15 fathoms water, over clay, off the east side of Beschutter islet.

Tiga islets, three rocky islets, lying about 7 miles southward of Lubuk bay and 2½ miles off shore, appear as one when coming from the south-eastward. The westernmost islet is the largest, and on its north-west side a reef, which projects 2 cables, is indicated usually by breakers; between the two south-easternmost islets there are depths of 18 fathoms, and between them and the coast 10 to 26 fathoms.

Lat. 5° 54½′ S. Long. 105° 43′ E. Chart, 3,611.

VARKENSHUK, or HOG POINT (Tanjong Tua), is the south-eastern extreme of Sumatra, and between it and Fourth point on the Java coast, distant 14 miles, is the narrowest part of Sunda strait. The point has a round hill within it, 390 feet above high water and covered with large trees, and is easily distinguished when approaching it from the eastward. Half a cable westward of the point is a rock above water, and the water is deep close to the shore.

Coast.—The coast from Varkenshuk trends, in a north-east direction, for 6 miles to Steile huk. Tanjong Bawang, at one mile eastward of Varkenshoek, is precipitous, and the coast from thence to Steile point, near mount Andong, is fringed by reef to the distance of half a cable. Midway between Varkenshuk and Steile huk and half a mile inland is Begantungan village, a small, unnavigable river entering the sea half a mile southward of it.

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ZUTPHEN ISLANDS are situated along the Sumatra coast north-eastward of Varkenshuk, extending north-east and south-west about 5 miles by 2 miles in breadth. The four larger islands and three of the smaller are high and densely wooded, the remainder being coral islets, some with scanty vegetation; between them are many reefs. The passage westward of the group is generally used by coasting vessels, but for others it is not recommended. The islands are "steep-to" on their south side, having a depth of about 40 to 50 fathoms near them. Chart, 3,611. Var. 0° 30′ E.

Tidal streams.—In the west monsoon both flood and ebb streams are felt with some strength amongst the islands.

Kandang, the south-westernmost of Zutphen islands, is about $1\frac{3}{4}$ miles in length, in a N.E. by N. and S.W. by S. direction, 7 cables in breadth, 320 feet above high water, and covered with large trees. Off its north-west side are two coral reefs, each having a dry sandbank at its north end, and the east side of the island is bordered by a small reef. Lat. 5° 54′ S. Long. 105° 45′ E.

Anchorage.—On the north-west side of Kadang there is a small bay that affords a safe anchorage to coasters in from 11 to 12 fathoms water, close inshore.

Penjurit and Hoog islands.—Penjurit (Hout island), lying to the eastward of Kandang, the third island in size, has on its south side a ridge 300 feet above high water, and on its eastern point a hillock 177 feet; it is three-quarters of a mile in length, half a mile in breadth, and has a reef bordering its northern and eastern sides.

Hoog islet is about 4 cables in length, 3 cables in breadth, and 315 feet above high water; southward of it a small islet.

Sindo, a rocky island lying close to the coast, north-westward of the south point of Kandang island, is about 2 cables in length in a north-north-west and south-south-east direction, and has a small hill on its south-west side; it is almost surrounded by a small reef.

Dangers.—Pembubuan reef, altogether dry, lies north-west of Sindo, near the coast and inside the 5-fathoms line.

Gosong Begantungan, with many rocks above water, lies one cable northward of Sindo, and 2 cables eastward of it there is a rock with 4 fathoms water over it.

Anchorage.—On the west side of Sindo there is a narrow cove about a cable long, with from 2 to 3 fathoms water, and small vessels can cross the reef at high water.

Anchorage may be obtained southward of Sindo island, in 5 fathoms water, over sand, with the south point of Kandang island bearing S.E. $\frac{1}{8}$ E.; but it is open to the swell from the southward. Just to the

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Chart. 3,611. Var. 0° 30′ E.

westward of Sindo there is a stream of good water, near Begantungan village, with anchorage off it, in depths of from 6 to 7 fathoms.

Kelapa island, north-westward of Kandang, and close to the coast of Sumatra, is about a cable in length in a north-east and south-west direction, low, and surrounded by a reef, which is "steep-to." There are depths of from 16 to 27 fathoms between this island and the coast.

Gebroeders, lying to the northward of Hoog island, are two low islets, each about two cables in extent, and surrounded by a small reef, with deep water close-to; between the islets there is a narrow passage with from 7 to 12 fathoms water. About 2 cables west-south-west of the western island there is a small rock with 4 fathoms water over it.

Lat. 5° 51½′ S. Long. 105° 47′ E

Rimau island, the northernmost, largest, and highest of the Zutphen islands, has two summits, 802 and 718 feet above high water, and is 1½ miles in length in a north-north-east and south-south-west direction, with a breadth of a mile. The north-west end of the island is low for 400 yards from the extremity, a portion of which is a sandy beach, affording a good landing place. The island is partly fringed by a reef to the distance of half a cable with 5 fathoms close-to.

Boompjes reef, parallel with the western part of the south coast of Rimau island, is 4 cables in length in an east-south-east and west-north-west direction; at low water the east and west ends dry, and at high water some stones still show. Between the reef and island is a passage, from 60 to 80 yards wide, with from 10 to 12 fathoms water.

Gijang reef, off the west coast of Rimau, abreast Tompul island, is 2 cables long and partly dry; between it and the island is a passage, 150 yards wide, with depths of from 8 to 10 fathoms.

Geni reef, N.E. ⅜ N., distant 2 cables from the north-west point of Rimau, has two sandbanks, one of which dries, and some rocks above water, with depths of 11 and 12 fathoms close-to; it is about 1½ cables in length in a north-east and south-west direction and half a cable in breadth.

Rimau kechil, a rocky islet 212 feet above high water, and about a cable in diameter, lies close to the north-east point of Rimau, with from 14 to 17 fathoms water in the channel between.

Tompul island, westward of Rimau, is about 2 cables in length in a north-east and south-west direction, low, wooded, and surrounded by a narrow reef, which is "steep-to."

Kramat, an islet to the southward of Tompul, is rather more than a cable long, in a north-east and south-west direction, and half a cable broad; northward of the islet there is a reef with a rock above water on it.

Katila is a small islet southward of Kramat, and between them there is a rock with 3 fathoms water over it.

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Dangers.—Southward of Tompul and nearly in mid-channel are two steep coral rocks, named Panalang and Usumbera, each with small sand patches just showing above high water. Close around and between these reefs are depths of from 7 to 23 fathoms. Further south lies a coral rock, "steep-to" and dry at low water. Chart, 3,611. Var. 0° 30′ E.

Steile huk, on the Sumatra coast, abreast the north point of Rimau, is bluff and steep, the ridge of hills behind attaining at mount Andong the height of 812 feet above high water; northward of Steile point the shore reef extends one cable off the village, while still farther north the coast is fronted with a mudbank, which makes landing difficult. Lat. 5° 59′ S. Long. 105° 46′ E.

Anchorage.—The Sumur, a small river, runs into the sea northward of Steile huk, and in the west monsoon there is good anchorage in 9 to 10 fathoms water, over mud and sand, north-eastward of Steile huk with the village and a fresh-water spring nearly abreast.

Directions.—Working out of Sunda strait during the north-west monsoon.—The best route is between Zutphen islands and Stroom rocks, giving Zutphen islands a berth of 1½ miles, thence work up by short tacks along the coast of Sumatra to Varkenshuk. In working through the passage between Sebuku and Sumatra, pass either northward or southward of Tiga islets, as most convenient; thence to the northward of Tims island, and between it and Sunchal, or through Lagundi strait. In this manner a sailing vessel will make a quick passage through the strait, if the wind be not too variable, besides having the advantage of anchoring on the east side of Sebuku island, or in Lampong bay, if the current or wind be too strong.

This route is not known to have been affected by the earthquake of 1883, but great caution should be observed.

There are, however, on record many instances of vessels having worked out of the strait along the coast of Java, during the westerly monsoon, with more ease and celerity than could have been effected by stretching into Lampong bay, in consequence of the westerly current having at those times developed its chief strength along the former side of the strait. (*See* Tidal streams, page 401.)

COAST.—Sunda strait, northern approach.—Aspect.—The coast northward of Steile huk is low, sandy and overgrown, and trends northward for a distance of 3 miles to Kangalan point, thence in the same direction about 150 miles to Banka strait. About 2 miles westward of Kangalan point are Guchi and Taman, two hills 820 and 827 feet above high water; the former appears as a broad, truncated cone, the latter is also broad, with its highest point on the south side; thence northward the country is densely wooded and flat as far as Nibung river.

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Chart, 2,056 [2,545].
Lat. 5° 26′ S.
Long. 105° 44′ E.
Var. 0° 30′ E.

Nibung hill, 774 feet above high water, the southern peak of a group of hills, situated about 22 miles northward of Kangalan point, is rather conspicuous from the southward. Mount Imbung, 840 feet above high water and covered with trees, lies about 6 miles northward of it; Knobbelberg, or Labuan Ratu hill, 968 feet above high water, 8 miles farther to the north-westward, has a knob on its crest, and when coming from the southward will be seen directly it opens of mount Imbung.

Kangalan point, 3½ miles northward of Rimau, is low, and the village lies within the point.

Reefs.—A coral reef, 2 cables in diameter, with a least depth of 2½ fathoms over it, lies 2 cables eastward of Kangalan point, and about one mile southward of Logok island, with depths of 5 to 10 fathoms close-to. A coral patch with a depth of 6 fathoms lies 2½ cables north-east of this reef, and a patch with 2½ fathoms water at half-a-mile southward.

Lat. 5° 47′ S.
Long. 105° 48½′ E.

Logok is a small but high island covered with vegetation, lying one mile north of Kangalan point, one cable within the edge of the 3-fathoms contour line, and half a mile off shore.

The Gezusters (Sisters) are three small, low islands lying about 2½ miles northward of Logok island. The northernmost and largest is about 2 cables in extent, its western part covered with high cocoa-nut trees; on the east side there is a marsh. The other two are covered with trees and bushes, but not so readily distinguished from any distance. They all lie within the edge of the 3-fathoms contour line, and each island is surrounded by a small coral reef; the western island is 2½ cables from the shore, and the depths between are from one fathom to 1½ fathoms.

Dangers.—A patch, with a depth of 5½ fathoms over coral, and 13 to 20 fathoms around, lies at one mile eastward of the northern Gezuster.

A patch, over which the depth is 8 fathoms, is situated about $1\frac{1}{10}$ miles eastward of the southern Gezuster.

Lat. 5° 41′ S.
Long. 105° 50½′ E.

COAST.—North island, lying 3½ miles north-north-eastward of the Gezusters and 2 miles from the shore, is a low coral island, covered with high shrubs and here and there trees; it is about 4 cables in length in a N. by E. and S. by W. direction and 2 cables in breadth, and encircled by a coral reef, with some rocks above water on it, extending in some places to the distance of a cable. Two conspicuous trees, near the north end of the island, may be seen from a distance of 14 miles.

Sina islet, lying about a cable southward of North island, is covered with bushes and surrounded by a coral reef, which extends nearly half a

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cable from the north and south points, and on which here and there lie some rocks above water. Chart, 2,056 [2,545]. Var. 0° 30′ E.

Sibrandi reef, "steep-to" and consisting of coral, rocks and hard ground, with a depth of 3½ fathoms over it, and 6 to 8 fathoms close-to, is about 2 cables in length in a N. by E. and S. by W. direction and nearly a cable in breadth, and lies with Sina island bearing W. ⅛ N., distant about half a mile; a coral patch, about 1½ cables in extent, with 5½ fathoms water over it, lies 1½ cables N.N.W. of it. Mount Andong open eastward of Logok islet, bearing about S.W. ½ S., leads eastward of these patches.

Between North island and the mainland there is a channel about 3 cables wide with from 8 to 16 fathoms water. Vessels taking it should pass about 1½ cables westward of the island; keeping the summit of Rimau island open just eastward of the northern Gezuster, bearing about S. by W. ¼ W., will lead clear of the edge of the 5-fathoms bank extending from the shore.

Anchorage.—Between North island and the Gezusters the coast is edged by a mudbank and at 2 miles from the shore, good anchorage will be found in from 8 to 10 fathoms water, over mud, with North island bearing N. by E., and about the same distance. Small craft will find good anchorage between the Gezusters and the coast in from 2 to 3 fathoms water.

In the easterly monsoon there is a considerable sea at times; vessels may then anchor under the lee of North island, in depths of from 10 to 16 fathoms, over mud and sand. The holding ground is generally good in these anchorages, but the bottom should be ascertained before anchoring, as many isolated patches of coral exist.

From North island to Sekampung river the 5-fathoms contour line is 1½ miles from the shore and close to the steep shoal edge of the bank.

Sekampung point, on the south side of the entrance to Sekampung river, is covered with high trees and, from the southward, sharply defined, but when abreast the entrance to the river is difficult to distinguish. Lat. 5° 34½′ S. Long. 105° 50′ E.

The river, situated 6 miles northward of North island, is the largest in the Lampung district and about 2 cables wide in the entrance, and half that width at a short distance within; it takes its rise in the mountains situated at the head of Keizer bay, and traverses the whole southern portion of Sumatra; Asahan village is about 32 miles from its mouth. There is not less than 2 feet at low water, and 3½ to 4 feet at high water on the bar, deepening to 4 and 5 fathoms within, where boats may water during the ebb tide, but during the east monsoon the bar breaks. The velocity of the stream in the river is from 1½ to 2 miles an hour.

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Chart, 2,056 [2,545]. Var. 0° 30′ E.

Anchorage.—There is good anchorage at about 1½ miles off the entrance, during the westerly monsoon, in 6 fathoms water, over mud, with North island bearing S. ½ W. and the mouth of the river S.W. by W. ¾ W.

Coast.—From Sekampung point the coast is low, marshy, and covered with high trees to the water's edge, which may be seen from a distance of 14 miles, and trends northward 19 miles to Penat point and river; some small rivers run into the sea on this coast, the principal being the Nibung and the Maringei, which latter can be ascended by small vessels to Maringei, a flourishing village.

The Maringei river debouches on the coast, directly eastward of mount Imbung, and may be entered by boats at high water; northward of it a sandy beach commences, whilst to the southward it is marshy, and tall trees fringe the shore.

The coast bank with coral heads, some with 3 feet water over them, is 2 miles wide, and the 5-fathoms contour line, which off the Sekampung river is 1½ miles from the coast, is, southward of Penat point, about 5 miles distant.

From Penat point, which is conspicuous only from the southward, the coast continues in a northerly direction for 20 miles to Sekopong point, and is fronted by shallow banks extending off the latter point more than 10 miles.

Sekopong point is prominent, rounded, and wooded; its extreme is a peninsula half a mile long, covered with high trees.

Lat. 5° 26′ S. Long. 105° 44′ E.

Nibung hill, 16 miles northward of North island, the southernmost of a group of summits within this portion of the coast, is 774 feet above high water, and somewhat conspicuous from the southward. Mount Imbung, 6 miles further northward and 840 feet above high water, is covered with trees and is the most prominent, being but 3 miles from the coast.

Lat. 0° 16′ S. Long. 105° 39¼′ E.

Knobbelberg, 968 feet above high water, is 8 miles north-westward of mount Imbung and has a conspicuous knob on its summit.

Dangers.—A coral patch lies within the 3-fathoms contour line, 1½ miles off the mouth of the Maringei river, with mount Imbung bearing W. ⅞ N, distant 5 miles.

A small rocky reef about half a cable in diameter, on which the least depth is 3 feet over mud and sand, with 3¼ fathoms close-to, lies with Penat point bearing N. ⅛ E. and mount Imbung W. by S. ⅔ S.

Shahbundar bank.—Between Penat point and tanjong Sekopong, situated 20 miles to the northward, the shore bank, within a depth of 5 fathoms, extends 9 miles off abreast the Two Brothers islands, the

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channel between the bank and those islands being about 6 miles wide. Within this 5-fathoms depth, and extending from 5 to 6 miles off shore, are several ridges of sand and coral with depths of $1\frac{1}{2}$ to 2 fathoms, named the Shahbundar bank, which lie immediately westward of Imbung hill bearing S.W. $\frac{1}{4}$ S. Chart, 2,056 [2,545]. Var. 0° 30′ E.

A ridge, about one mile in length in a north and south direction, and half a mile in breadth, lies 8 miles from the coast, and on it is a patch, with $2\frac{1}{2}$ fathoms least water over it, which lies with the highest part of the southern of the Two Brothers bearing S.E. by E. $\frac{1}{2}$ E. and mount Imbung S.W. $\frac{1}{2}$ S. Chart, 2,149 [2,548]. Lat. 5° 6′ S. Long. 105° 59′ E.

A patch with $3\frac{3}{4}$ fathoms water over it, from which the depth increases regularly to 5 fathoms, lies E. by N. $\frac{1}{4}$ N. distant $1\frac{7}{10}$ miles from the north point of the above ridge.

TWO BROTHERS (Segama) are low islets lying 15 miles off shore and S.E. $\frac{1}{2}$ S. distant 18 miles from tanjong Sekopong, and together extend one mile in a north and south direction. The northern islet is small and round, and the southern is 4 cables in length. They are thickly covered with brushwood and tall trees, one of which, on the southern islet, may be seen in clear weather from a distance of about 15 miles. Each islet is encircled by a coral reef partly dry, which extends in places to a distance of 2 cables. Chart, 2,056 [2,545]. Lat. 5° 10′ S. Long. 106° $6\frac{1}{4}$′ E.

A coral patch, with 3 feet water over it, lies 3 cables S.S.W. $\frac{3}{4}$ W., from the south islet.

There are depths of from 6 to 7 fathoms midway between the two islets.

Anchorage may be obtained round the islands; at one mile distant from them there are depths of from 8 to 14 fathoms, over mud or mud with sand.

Swallow bank, with a least depth of 22 feet,* is a round patch of coral, about half a cable in extent, with depths of from 8 to 10 fathoms, over mud and sand, close around, and lies with the highest part of the southern of the Two Brothers bearing N. by E. $\frac{1}{2}$ E., distant $7\frac{3}{4}$ miles. Vessels of heavy draught should give it a wide berth, as, except under very favourable circumstances (calm water and with a current of not less than one knot), there is no ripple to indicate its position. At one cable south of Swallow bank are two coral patches on which the least depth is $5\frac{1}{2}$ fathoms. Lat. 5° $17\frac{3}{4}$′ S. Long. 106° $4\frac{1}{4}$′ E.

Lynn reef, one cable in extent, composed of coral, and with a least depth of 2 feet over it, lies with the highest part of the southern of the Two Brothers bearing W. by N. $\frac{1}{4}$ N., distant $6\frac{1}{4}$ miles. There are depths of 6 fathoms close to the reef, deepening to 12 fathoms at

General chart, 2,149 [2,548].

* H.N.M. surveying vessel *Blommendal*, 1885, gives the least depth as 27 feet.

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Chart, 2,056 [2,545]. Var. 0° 30′ E.

one cable distant. The sea only breaks on the reef with an easterly swell.

The extremes of Two Brothers islands subtend an angle of 9° at the reef; if therefore they be made, whilst passing on (or within a point or more of) the above bearing, to subtend an angle of 8°, a vessel will pass about a mile outside the reef; and if an angle of 10°, half a mile inside it.

In calm weather the shoal from its dark colour is extremely difficult to see until close upon it; a sharp look-out should always be kept, as the shoal may only be detected by a slight ripple. At night it is recommended to close the Two Brothers islands and pass them at the distance of from one mile to 2 miles.

Lat. 5° 5′ S. Long. 106° 17′ E.

Brouwers reefs are two dangerous coral reefs, extending about 8½ cables in a N. by E. ½ E. and S. by W. ½ W. direction, with a dry patch of sand and rocks above water upon each, and depths of 11 to 14 fathoms around. Between the two patches there are depths of 10 to 14 fathoms, and round them 11 to 17 fathoms water, affording good anchorage.

The northern reef is round, and 3 cables in diameter, and lies with the southern Two Brothers island bearing S.W. by W. ¼ W., distant 11 miles; the southern patch is 3 cables in length and 2 cables in breadth. They may usually be seen from the distance of 2 miles.

Clearing marks.—Mount Imbung kept well open southward of the south Brother, bearing S.W. by W. ¾ W., leads southward, and the same mount open northward of the north Brother, S.W. by W. ¼ W., leads northward of Brouwers reefs.

Lat. 6° 16′ S. Long. 106° 24′ E.

The highest mountain seen in clear weather to the southward, when in this neighbourhood, is mount Karang (5,833 feet above high water), south-eastward of Anjer, but mount Gedeh, a round hill, 1,968 feet above high water, over St. Nicolas point, being about 20 miles nearer, is more often visible and is a good mark.

At night, vessels should steer to pass within a prudent distance of North Watcher light.

At about 6 miles north-westward of Brouwers reefs, with Two Brothers bearing S.S.W., distant 8 miles, a bank with 6½ fathoms (least water found) was passed over by H.M.S. *Magpie*, 1883.

NORTH WATCHER is about 3 cables in length, in a north-north-east and south-south-west direction, 1⅓ cables in breadth and covered with shrubs and high trees, the tops of which are visible in clear weather

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from a distance of 14 miles. On the north-west side there is a cove with a rough pier, which has a flagstaff at its extremity, and affords landing for boats. Chart, 2,056 [2,545]. Var. 0° 30′ E.

The island is surrounded by a coral reef, which dries in places, and extends on the east and south sides a distance of 2½ cables.

LIGHT.—Near the centre of North Watcher island, an iron frame tower, 157 feet in height, painted white and with a stone dwelling, exhibits, at an elevation of 159 feet above high water, a *white fixed* and *flashing* light with a period of system of *one minute*, which is *fixed* for *fifty-two* seconds, and shows a *flash* of *eight seconds* duration, and should be seen, in clear weather, from a distance of 18 miles. Lat. 5° 12¼′ S. Long. 106° 27¾′ E.

Dangers.—Omega rock, about 1½ cables in extent, and with a depth of 3 feet over it, is "steep-to," and lies 5½ cables, E.S.E., from North Watcher lighthouse.

Karang Pajong, a round coral reef about a cable in diameter, with a depth of 5 feet over it, lies 5½ cables, S. by W., from North Watcher lighthouse. Between these reefs and the island the depths are 14 to 16 fathoms, over mud and sand. These reefs will be avoided by keeping the angle of elevation of the light at 2° or less.

Anchorage.—At the distance of about 7 cables from the lighthouse, in all directions, there is good anchorage in 12 to 13 fathoms water, over sand and mud; nearer the island the depth increases.

Arnemuiden bank is a sandbank above water, on a coral reef about a quarter of a mile in extent, awash in places at low water, with depths of 12 to 13 fathoms close-to. It lies with North Watcher lighthouse bearing West, distant 16¾ miles. Lat. 5° 12¾′ S. Long. 106° 44½′ E.

Beacon.—An iron, screw pile, beacon, surmounted by a cone, painted black, marks the western side of Arnemuiden bank.

Etna bank, situated S.E. by E. ⅝ E., distant 11 miles from Arnemuiden bank, is also about a quarter of a mile in extent, with a similar dry sandbank near its centre. There are general depths of 12 fathoms, mud all round, at about 3 cables distant, with deeper water nearer the bank. Lat. 5° 17¾′ S. Long. 106° 54½′ E.

Buoy.—A large buoy, painted red, marks Etna bank.

THE THOUSAND ISLANDS, situated in the northern approach to Sunda strait, are about 80 in number and, with their outlying dangers, occupy a space of about 23 miles in a north-north- Lat. 5° 24′ S. to 5° 47′ S. Long. 106° 23′ E. to 106° 37′ E.

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Chart, 2,056 [2,545]. Var. 0° 35′ E.

west and opposite direction, with a breadth of 12 miles near their northern end, and 5 miles at the southern.

The islands are mostly low, of coral formation, and densely covered with trees, the tops of which are visible from 14 to 16 miles; they are all encircled by steep coral reefs that at low water are partially or entirely uncovered.

The north side of the group is clear of danger; off the north-west side, Jason rock is the westernmost known danger, situated about 8 miles from the nearest island.

On the western side of the group are several isolated reefs, varying in distance from one mile to 2 miles off the islands, but they may generally be seen by the discolouration of the water.

Three of the islands near the centre of the group are inhabited, namely, Panjang, Pelemparan, and Kelapa, the two latter lying close together. Each has about 200 inhabitants. Other islands of the group are temporarily inhabited by fishermen.

It is not advisable to attempt any of the intricate passages between the islands without local knowledge.

The islets and shoals bordering the eastern side of the navigable track to Banka strait will now be described; full detailed information of the whole of the group will be found in Eastern Archipelago, Part II.

Tides.—It is high water, full and change, at 10 hours; springs rise $3\frac{1}{4}$ feet.

Tidal streams.—In calms and light winds, the flood runs to the eastward and ebb to the westward, the former being stronger than the latter. The usual strength is not more than one knot per hour; the greatest observed was 2 knots.

Winds are stronger here than under the Java shore, more so in the south-east than north-west monsoon, and land and sea breezes are but little felt. The force of the wind is greater at night, but steadier during the day.

Lat. 5° 24½′ S. Long. 106° 16½′ E.

Jason rock, a dangerous coral patch in the fairway to and from Sunda and Banka straits, is about 50 yards in diameter, with a least depth of $2\frac{1}{4}$ fathoms, and from 16 to 19 fathoms close-to, except off its south-east side. The water is discoloured immediately around it, but at a short distance its position is only discernible occasionally by tide ripples. It lies with pulo Pebelokan or West island, bearing S.E. by E. $\frac{3}{8}$ E, distant $8\frac{1}{4}$ miles, and North Watcher lighthouse N.E. $\frac{1}{4}$ N.

Arminia rock, composed of coral and stone, is circular in shape, and about 55 yards in diameter, with a least depth of $2\frac{1}{2}$ fathoms over it, and 12 to 16 fathoms, over mud, close around; it lies with the south

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extreme of West Dua island E. $\frac{1}{3}$ S., distant $6\frac{1}{4}$ miles. Under favourable conditions its position is indicated by ripples, but not by discolouration of the water. Chart, 2,056 [2,545]. Var. 0° 35′ E.

Hereward reef, composed of rocks and coral, is about 3 cables in length in a north-north-east and south-south-west direction, and a cable in breadth; it has $1\frac{1}{2}$ fathoms least water over it and 15 to 16 fathoms around, and lies with North Watcher lighthouse bearing N. by E. $\frac{1}{8}$ E., distant 12 miles, and the north point of West Dua island E. by S. Its position may possibly be recognised by tidal rips, but not by discolouration of the water.

Pulo Pebelokan or West island, the north-westernmost of the group, is 3 cables in length in an east-north-east and west-south-west direction, and 2 cables in breadth, densely wooded, with high trees, and "steep to" at half a cable distant, except off its sandy north-east point, where the encircling reef extends off a distance of 2 cables. The depths around the island are from 15 to 18 fathoms, and the tops of the trees are visible from a distance of 13 miles in clear weather. Lat. 5° 28¾′ S. Long. 106° 23¾′ E.

Coventry reef, of coral, is 2 cables in extent, and awash at low water; foul ground extends about 2 cables north-west of it; on other sides there are depths of 16 to 18 fathoms, over clay and shells, at the distance of half a cable. The reef is marked by discoloured water, breaks with a slight swell, and lies with pulo Pebelokan bearing N.N.E., distant one mile.

East Dua island in line with pulo Pebelokan, bearing N.E. by E. $\frac{1}{4}$ E., leads northward, and East Dua in line with Rangat islet, N.E. $\frac{1}{2}$ E., leads south-eastward of Coventry reef.

Rangat islet is round, one cable in diameter, and surrounded by a sandy beach, with a reef extending in places to the distance of one cable. It is overgrown with shrubs, with a few tall trees, and has depths of from 16 to 25 fathoms, over mud and sand and sometimes clay around it. Lat. 5° 28′ S. Long. 106° 26¾′ E.

Rangat reefs, about 7 cables in length, in a north-east and south-west direction, and 2 cables in breadth, are three detached patches with a least depth of 3 feet over them, and with deep water between and around them. From their extremes, Rangat islet bears N.N.W. $\frac{1}{8}$ W. and W.N.W. about one mile. They generally show by discoloured water and sometimes break.

Edeling reefs, two small, rocky patches, with depths of 4 and $4\frac{1}{2}$ fathoms over them, are situated north-eastward of Rangat islet, and 4 cables apart in an east and west direction. Their positions are occasionally marked by tide rips; both are "steep-to," with 15 fathoms water, over mud, at a short distance. The western reef lies with Rangat island bearing S.S.W. $\frac{1}{4}$ W., distant $1\frac{1}{2}$ miles.

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Chart, 2,056 [2,545]. Var. 0° 35′ E.

Beronang reef, of rocks and coral, about one cable in extent in a north-east and south-west direction, with 1½ fathoms least water over it, and 14 to 18 fathoms around, lies three-quarters of a mile north-west of the western Edeling reef, with North Dua bearing N.E. ¾ E. distant about 2 miles. It does not always show by discoloured water or ripplings.

Dua islands, the northernmost of the group, are thickly covered with high trees; the eastern is situated S. ⅞ E., distant 13 miles from North Watcher lighthouse. They are each about 3 cables in length, and encircled by reefs to the distance of one cable. Northward of these islands the depths are regular, from 17 to 19 fathoms, over sand and mud, and between them the channel is clear with 16 to 18 fathoms, over mud.

Inderaputeri or Cora reef, with a least depth of 1½ fathoms, and nearly 3 cables in length by one cable in breadth, is surrounded by depths of from 13 to 15 fathoms, over sand, and lies with the west extreme of Jagung island bearing S.E., distant one mile.

Channel.—There is a channel about 3 miles wide between Rangat and Edeling reefs on the west and Inderaputeri reef on the east. Vessels from the southward may pass through, by keeping East Dua island between the bearings of N.N.E. ½ E. and N. by W. until North-east island (Panchalirang Besar) bears southward of East.

Baka, a patch with a depth of 7½ fathoms over it, lies between those bearings, with Jagung island bearing N.E. ½ E., distant about 3½ miles.

Lat. 5° 28¾′ S. Long. 106° 31½′ E.

Jagung island, the north-west extreme of the main group, is nearly 4 cables in length in an east-north-east and west-north-west direction, and one cable in breadth, densely wooded, and encircled by a reef to the distance of one cable.

Reef.—A reef, with 3 fathoms water over it, stony bottom, lies about half a mile northward of Jagung island; it is "steep-to," with depths of from 13 to 15 fathoms around.

North-east island (Panchalirang Besar), 3 miles north-eastward of Jagung island, and the north-east island of the main group, is 4½ cables in length, 2 cables in breadth, densely covered with trees, and encircled by a reef extending to the distance of about 2 cables from its eastern side.

Beteloran Kechil islet, lying 2 cables north-west of it, is small and surrounded by a coral reef that in places extends one cable from it.

Panchalirang island, also heavily overgrown with high trees, is half a mile south-west of, and smaller than, North-east island; it is surrounded by a reef extending from half a cable to 2 cables.

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Panchalirang reef, of coral and rock, with 2 fathoms water over it, lies 4 cables N. by W. of Panchalirang island; detached patches lie also the same distance southward and westward of that islet. Chart, 2,056 [2,545]. Var. 0° 35′ E.

Beteloran Besar, a small, thickly overgrown islet, lies 4 cables westward of Panchalirang island and is surrounded by a small reef.

Butun islet, of sand and coral, with a broad spreading tree in the centre, lies three-quarters of a mile westward of Panchalirang islet. Two small coral patches with depths of one fathom and 3 fathoms over them lie N.W. by W. and N. ½ E. respectively, distant 2 cables from Butun islet.

Ringit island, covered with high trees, lies nearly 2 miles southward of North-east island, and is 3½ cables in length, with a reef extending 1½ cables south-eastward of it. Lat. 5° 29¾′ S. Long. 106° 34¾′ E.

Mayang reef, the only known danger to the eastward of the Thousand islands, beyond the reefs encircling them, is about half a cable in extent, with a least depth of 4½ fathoms over it, and surrounded by depths of 18 and 19 fathoms, over mud; it lies with Ringit island bearing S.W. by W. ½ W., distant $1\frac{3}{10}$ miles. For islands southward, *see* Eastern Archipelago, Part II.

SUNDA STRAIT TO BANKA STRAIT.—Coast.— The coast between Sekopong point and Kenam point, 16 miles to the northward, is low, marshy, and thickly wooded. The outer danger is Clifton bank, about 9½ miles eastward of Sekopong point. Within a depth of 8 fathoms the bottom is irregular; a least depth of 10 fathoms should be preserved. Chart 2,149 [2,548].

From Kenam point northward to Lucipara point at the entrance to Banka strait, a distance of about 87 miles, the coast is also low, marshy, and almost uninhabited. At only a few places is there a sandy beach; with the exception of these, and before the mouths of the larger streams, the coast is fronted by a soft mudbank, which dries to distances of from one cable to 4 cables or sometimes more, rendering landing impracticable. Lat. 4° 40′ S. Long. 105° 54½′ E.

The Masuji and Lumpur rivers afford communication for small trading craft with Palembang.

In clear weather, or during the westerly monsoon, the tops of the trees are visible from the deck, from a distance of about 16 miles in the offing. The two principal points of recognition are the high trees on Menjangan point, and those between Serdang and Bungin points southward of Tulang Bawang river; but as depths of less than 3 fathoms, "steep-to," extend about 14 miles off shore in about the

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Chart, 2,149 [2,548]. Var. 0° 35′ E.

parallel of these, they should not be sighted from the deck, but a least depth of 10 fathoms maintained when navigating along this coast in other than light draught vessels.

Lat. 4° 11′ S. Long. 106° 12′ E.

Patches of 4 fathoms, fairly "steep-to," lie about 23 miles off shore between those points. The holding ground is good everywhere, but is irregular within a depth of 8 fathoms.

Tides.—The tides are diurnal; in the middle of June it is high water from Menjangan to Lucipara points between 10h. 30m. and 11 hrs. p.m., the times of high water at Sekopong point and North island being 1 hour and 3 hours, respectively, in the morning; these times are two hours earlier each following month. Springs rise, south of Banka strait, 8 feet; at Menjangan point 7 feet, and neaps 3 to 4 feet; near Kenam point 4½ feet at springs and 2½ feet at neaps; and near Clifton bank 4 to 5 feet at springs and 2 feet at neaps.

Tidal streams.—In the east monsoon the south-going stream sets S.S.W. and S.W., and the north-going stream N.W. and N.N.W.; in the west monsoon these streams set S.S.E. and S.E., and N.N.W. and North, respectively. The streams turn against the sun and about the same time as low water, their greatest rate amounting to 1½ knots an hour.

The east and west monsoons strengthen the south-going and weakens the north-going streams.

Off Clifton bank, near Sekopong point, in the east monsoon, the north-going stream, to the N.W. and N.N.W., has been observed to run for 6 hours and set the whole remaining part of the day to the S.S.W. and S.W.; setting, during the west monsoon, for about 6 hours to the northward and the remainder of the day to the southward. The greatest rate of the north-going stream is 1½ knots, and of the south-going stream 1¾ knots.

In the vicinity of Banka strait and Menjangan point, at the full force of the west monsoon, a stream to the southward, with a greatest rate of 2¼ knots, is sometimes experienced every day; sometimes also, during a day, a stream setting north, with a rate of half a knot for four hours.

Winds.—In this part of Java sea the south-east monsoon cannot be depended on before the middle of May, and lasts until October; during this season it may vary between south and north-east.

The weather is dry, with fresh breezes and hazy skies, the haziness being least in the morning hours, but the coast is seldom seen.

In November very variable winds may be expected, but in December the westerly monsoon blows with increasing steadiness; in January the

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general direction is west-north-west, and in February north-west, after that a retrograde movement sets in with a gradual decrease in steadiness; in March it is west-north-west, and in April west-south-west. Chart, 2,149 [2,548]. Var. 0° 35′ E.

Rain is more plentiful during these months, with heavy squalls which are more frequent at night, and the haziness is less.

During the easterly monsoon the wind is most steady by night, and in the westerly by day.

In both seasons, in daytime the wind will shift to northward as the Sumatra coast is approached and the influence of the sea breeze is felt; and at night it will combine with the land wind, and draw round to south-west or west. These land and sea breezes may sometimes be felt as far eastward as North Watcher.

COAST.—Sekopong point is a rounded prominent point, covered with trees; its extreme, a small peninsula, has some tall casuarina trees on it, with lower trees on the neck. Lat. 4° 56′ S. Long. 105° 54½′ E.

The coast between Sekopong point and Kenam point, situated 16 miles northward of it, is marshy and thickly wooded; the tops of the trees are visible about 16 miles in clear weather, but there are no points for identification. The Knobbelberg and mount Imbung, to the southward, will be seen during the westerly monsoon, the clear weather season.

At about 2 miles northward of Sekopong point, in a small bay, are two houses inhabited by fishermen, standing under a few cocoanut trees. Landing is difficult at low water on account of the mud flats fronting the coast.

The 3-fathoms contour line is generally about 5 miles from the coast, and the 5-fathoms at 8 miles, but within a depth of 8 fathoms the bottom is irregular; vessels should keep in about 10 fathoms. Anchorage may be obtained anywhere.

Water.—During the westerly monsoon fresh water is obtainable at the Wakau stream, 4 miles northward of the houses.

Shoals.—A shoal with a depth of 1½ fathoms, over hard sand, outside the 3-fathoms contour line, lies with Sekopong point bearing N.W. ⅞ W., distant rather over 5 miles.

Clifton bank, situated E. ⅛ N., distant 9 miles from Sekopong point, has a least depth of 2¾ fathoms, over hard sand; it is "steep-to" on its south side, but eastward and northward the depths decrease gradually towards it.*

Seputi river entrance is 800 yards wide with densely wooded banks; it is from 30 to 40 yards wide, with depths of 3 to 4 fathoms for a distance of 32 miles, but the bar fronting the entrance has but 3 feet

General chart, 2,149 [2,548].

* In 1905 a buoy, painted red, marked the position of a wreck lying in 7 fathoms water about 2½ miles east south eastward of Clifton bank.

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Chart, 2,149 [2,548]. Var. 0° 45′ E.

over it at low water, rendering it navigable only for small coasting craft. The principal village, Surabaya Ilir, is on the right bank of the main stream, 6 miles above its junction with the Trusan, and about 12 miles above the entrance.

Shoal.—A patch with 3 fathoms water, over hard sand, lies E. by S. $\frac{7}{8}$ S., distant 8 miles from the mouth of Seputi river.

Anchorage.—There is anchorage about 4 miles off the river, in $3\frac{1}{2}$ fathoms water, over soft mud, with the river mouth bearing N.W. by W., distant 4 miles, and Kenam point N.N.E. $\frac{2}{3}$ E.

Tides.—Springs rise 5 feet, neaps from 2 to 3 feet.

Lat. 4° 40′ S. Long. 105° 54½′ E.

Kenam point, northward of Seputi river, is thickly wooded and prominent when seen from the southward.

Bungin and Serdang points.—The coast tends northward from Kenam point to Bungin point, a distance of 8 miles, the shallow bight between being Telok Baru or Baharu; thence northward to Serdang point, in which portion are the highest trees in this neighbourhood, as before stated.

Lat. 4° 44′ S. Long. 106° 16′ E.

Seven-fathoms bank.—Just southward of the parallel of the Seputi river, depths of 7 fathoms are found at a distance of 24 miles from the shore, the bottom being grey mud, sand, and fine shells with some stones.

Tulang bank.—The shore between Kenam and Serdang points, and as far as Tulang Bawang river, is fronted by a bank of mud and sand, with depths of $1\frac{1}{2}$ to 3 fathoms, to a distance of about 7 miles. Seaward of these is Tulang bank, consisting of many isolated patches of hard sand and broken shells, with depths ranging from one fathom to 3 fathoms, and deep water between over a mud bottom, extending to the distance of nearly 14 miles off shore.

The two most outlying have depths of 2 and $2\frac{3}{4}$ fathoms, and lie respectively, with Kenam point bearing S.W. $\frac{1}{4}$ W., distant $15\frac{1}{2}$ miles, and S.W. by W. $\frac{5}{8}$ W., about $12\frac{1}{2}$ miles. The 2-fathoms patch is about a mile square and "steep-to" on its seaward side, with depths of 11 and 12 fathoms at a short distance; the other shoal is about 4 cables in length in a north-east and south-west direction. The shallow heads break occasionally during the easterly monsoon only.

Lat. 4° 24′ S. Long. 105° 51′ E.

Tulang Bawang river is about the largest on this coast. It is 2 miles wide in its entrance between Tmak and Bubuayan points, with a low water depth of $3\frac{1}{2}$ feet on its bar (springs rise $5\frac{1}{2}$ feet), and is thus available at times for vessels of about 8 feet draught. Within the bar, the water rapidly deepens to 5 and 6 fathoms, and is still 2 fathoms deep and about 90 yards wide at 60 miles above its mouth.

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Settlements.—The fishing village of Dintch lies on the south shore, and on the same side at about 1½ hours steaming up the river is Telades village. Mengala, the residence of the Dutch Controller, and where there is considerable trade, is 60 miles up, with a depth in the river as above given. Chart, 2,149 [2,548]. Var. 0° 45′ E.

Water.—The river water is fit for drinking at low water at the end of the westerly monsoon, but at other times is brackish.

Beacons.—The bar channel and flats are marked by two large and ten small beacons.

Directions.—From the anchorage, in 4½ fathoms water, over mud, N.E. by N. distant 3 miles from the northernmost of the two large beacons, a S.W. by S. course should be steered to pass between the two large beacons, passing nearest to the southern one, thence close southward of the small beacons, which mark the flat extending from the north shore. The least water is within the eighth small beacon; on the south side of the passage some rocks dry at low water.

To reach the anchorage from seaward, from the southward, Tulang bank should be rounded by the lead, and Masuji river entrance steered for bearing about W.N.W., and when Tulang Bawang river mouth bears S.W. by W. the depths should be 7 fathoms; from this steer between West to W. by S. until in 5 fathoms water, when a S W. course will lead to the anchorage, with Babuayan point bearing S.W. by S., if not about to enter the river. It is only available with local knowledge, and the beacons are not to be depended on.

Off-lying banks.—Just outside the 3-fathoms contour line, and between the bearings of N.E. by N. and E. by N. ¼ N. from the northern of the two large beacons, there is a sandy ridge, 5 miles in length in an east-south-east and west-north-west direction, and one mile in breadth, with a least depth of 1¼ fathoms over it, which is dangerous to vessels approaching the anchorage.

About 2 miles south-westward of the western part of above ridge is another about one mile in length in a north-west and south-east direction, with a least depth of 2¼ fathoms over it.

Masuji river, situated 15 miles northward of the Tulang Bawang, is about one mile wide in its entrance between Pasir point on the north, and Masuji point on the south side, with a low water depth of 5 feet; springs rise 6 feet. It is deeper and of more importance than the Tulang Bawang, as it enables small trading craft to proceed by its tributaries and the Ogan river to the Residency of Palembang, a voyage of about 14 days. The main direction of the stream is north-westerly for about 50 miles, whence it turns south-west. Lat. 4° 9′ S. Long. 105° 49′ E.

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Chart, 2,149 [2,548]. Var. 0° 45′ E.

About 2 miles above Pasir point is the Sungi Bachak, which has a depth of 6 feet, and here the Masuji is about 3 cables in breadth. Lambung village is 10 miles up the Masuji.

Anchorage.—There is anchorage in about 3 fathoms water, 5 miles south-eastward of the entrance.

Directions.—Approaching from seaward steer with the entrance bearing about W.N.W. until in a depth of 5 fathoms, when a West course will lead to the anchorage.

To enter the river, from the anchorage steer towards the shore until Pasir point, which has some tall dark trees on it, bears N. by W., when it may be steered for, keeping towards Masuji point as it is approached to avoid the spit of mud and sand extending southward of Pasir point.

Four Fathoms banks.—Eastward of the entrance to the Masuji river a number of patches of mud and sand, with about 4 fathoms least water over them, will be found to a distance of 23 miles; the eastern group is about 4 miles in extent, in a north-north-west and south-south-east direction, at that distance, with depths of 6 to 8 fathoms between and around them. Vessels of other than light draught should pass eastward of them.

Lat. 3° 50′ S. Long. 105° 57′ E.

Menjangan point is a considerable rounded projection of the coast, with Telok Brugu or Gerugu within and northward of it.

The trees on the point and within it are rather low, but along the northern portion there is a narrow stretch of tall trees, which to the north-westward quickly decrease in height again to brushwood on the marshy land towards Sudan creek. The tall trees from the offing appear as an island; hence its name on former charts as Tree island.

These trees should not be in sight from the deck when passing Menjangan point, as the depths are only from 2½ to 3 fathoms at 9 to 10 miles east-south-east of it; a depth of 10 fathoms will avoid all dangers, and the lead should be kept going.

OFF-LYING BANKS.—About 8½ miles east-south-eastward of Menjangan point there is shoal, 3 miles in length, in a north-north-west and south-south-east direction and 4 cables in breadth, with a least depth of 2½ fathoms over it.

About 3 miles westward of, and parallel to, the above lies a narrow sandy ridge, 7 miles in length and 3 cables in breadth, with 2¾ fathoms water over it.

Between the above-mentioned ridges lie small shoals with depths of 2½ and 3 fathoms over them, and north-north-westward of the latter ridge there is a smaller sandy ridge with 1½ fathoms water over it.

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Arend bank is the south-east extreme of the 5-fathoms contour fronting Telok Brugu, northward of Menjangan point. It has a depth of 3¼ fathoms, and from 5 to 6 fathoms eastward and southward of it, with Menjangan point bearing W. by S. ¼ S. about 15 miles. The tops of the trees are visible in clear weather from it, if at a height of 11 feet or more above the sea. Chart, 2,149 [2,548]. Lat. 3° 47½′ S. Long. 106° 12′ E. Var. 0° 45′ E.

North-westward of Arend bank, within the 5-fathoms contour line, are patches of 2¾ to 3 fathoms with deep water between, and the bottom, though chiefly mud and sand, is hard in places. The northern of these patches, 3 miles in length in a north-north-east and south-south-west direction, and half a mile in breadth, with 2¾ fathoms water over it, lies with Pasir creek bearing W. ½ S. distant 15 miles. Between it and the creek, and also in the direction of Lucipara point, the bank fronting the shore with less than 3 fathoms over it, occupies most of the space.

Five Fathoms banks.—From 12 to 20 miles eastward of Arend bank, and extending over a distance of about 7 miles north and south, are the Five Fathoms banks. They consist of nine ridges or banks with depths of from 4¼ to 5 fathoms, over a surface layer of sand, and depths of 6 to 8 fathoms, mud and sand, between them; the depths gradually increase to 10 fathoms eastward of them, over a mud bottom.

The westernmost, known as the City of Carlisle bank, and the largest and shoalest found, is 2 miles in length in a north-north-west and south-south-east direction, 2 cables in breadth, and has a depth of 4¼ fathoms over it. The Boreas, to the northward, and an unnamed bank to the southward, of it, have depths of 4¾ fathoms; the others have apparently not less than 5 fathoms. The easternmost 5-fathoms patch lies with Menjangan point bearing W. ⅝ S. distant 34 miles. Vessels, proceeding to or from Banka strait, should not come under a depth of 10 fathoms when in their neighbourhood. Lat. 3° 46½′ S. Long. 106° 31′ E.

Depths of 7 and 8 fathoms are charted about 14 miles north-eastward of the Five Fathoms bank. These depths were reported by H.M.S. *Imperieuse* in 1894, as having been obtained by Thomson's sounding machine. As this locality has not been sounded, shallower water may exist in this neighbourhood, rendering it necessary for vessels to proceed with caution.

COAST.—Telok Brugu or Gerugu is the shallow indentation northward of Menjangan point; depths of less than 5 fathoms extend from 4 to 6 miles off. The shore is alternately sand and marsh; abreast the sandy portion landing may be effected, but the marshy portions are fronted by mud. The head of the bay is named Telok Sundan, and into which the creek of the same name discharges.

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Chart, 2,149 [2,548]. Var. 0° 45′ E.

Between this bay and Lucipara point the coast is all low and marshy, as before stated; several streams discharge here, the principal of which is the Lumpur. The mouths may be identified by the higher trees near them. The bank fronting the coast with depths of less than 3 fathoms, extends from 9 to 14 miles off shore, there being as little as 2 fathoms at 8 miles off shore. Its greatest distance is eastward of the Lumpur river.

Lat. 3° 24½′ S. Long. 105° 53′ E.

Lumpur river is of importance through being connected by its tributaries with Palembang, the Residency. The entrance is marked by nipa palms growing on the mudbank on either side, and has a depth at low water of 6 feet, increasing to 3 and 5 fathoms within; springs rise 7 feet. The river has a breadth of 1½ cables, decreasing gradually to about half a cable; its main direction is N.W. by W. with gentle curves in the lower portion, but after 1½ hours steaming the river becomes tortuous.

The small vessels proceeding from the Lumpur entrance to Palembang take about five days; the Lumpur is followed as far as Chambi village, thence by Buagin creek to Deling lake, and then by the Komerin up to Sira Pulu Padang, thence by the Pelaju and Musi rivers to Palembang.

Anchorage.—The anchorage off the river is in 3½ fathoms water, over mud, at a distance of 8 miles S.E. by E. from the entrance.

Riding river, 5 miles northward of the Lumpur, is half a cable wide, with a low water depth of 5 feet on its bar, with the high trees on the north shore bearing N.W. ¾ N.; the depths within the river increase to 2 and 2½ fathoms.

Lobong Itam creek, 2 miles north-eastward of Riding river, is about 90 yards wide with a least depth of 4 feet on its bar, which increases rapidly within to 2 fathoms; the best water over the bar is with the river mouth N.W. by W.

Coast.—From Lobong Itam creek the coast trends north-eastward to Lucipara point, a distance of 10 miles, and abreast the former is fronted by a bank of mud and sand, with less than 3 fathoms water over it, to a distance of nearly 14 miles, and a depth of one fathom at about 6 miles off; abreast Lucipara point the bank extends off about 2 miles. It may be approached to a depth of about 5 fathoms.

Although this coast is uninhabited, trading craft are frequently met with coming from Palembang by the Lumpur, and from Banka strait; the men navigating them set up temporary shelters on shore, generally at the mouths of the streams, and employ themselves with fishing or with the cutting of nipa palms. A mudbank, dry at low water, fronts the coast, with but little interruption, at distances of from one cable to 4 cables.

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DIRECTIONS.—Steam-vessels from Sunda strait to Banka strait proceed northward between Two Brothers and North Watcher islands, avoiding Jason rock by keeping North Watcher lighthouse bearing eastward of N.E by E., and when clear of Lynn and Brouwers reefs, a course is taken eastward of Five Fathoms banks. Charts, 2,149 [2,548], 2,056 [2,545]. Var. 0° 45′ E.

Sailing vessels usually steer direct for Two Brothers, keeping the southern island bearing northward of N. ¾ E. to lead eastward of Swallow reef.

Two Brothers islands may be passed on either side, westward of Lynn and Brouwers reefs; the channel west of the islands is 6 miles wide, but Shahbundar bank must not be approached into less than 7 fathoms water. When northward, these islands must be kept bearing westward of South.

Working north, it will be prudent to keep on the Sumatra side, and when northward of Sibrandi reef (page 437) to tack inshore when North island is in line with Rimau, the highest Zutphen island, in depths of 6 to 8 fathoms. Lat. 5° 41½′ S. Long. 105° 51′ E.

Two Brothers islands, bearing to the westward of South, clears Clifton bank, after which a depth of about 10 fathoms should be preserved, as a direct course cannot be depended upon on account of irregular currents or tidal streams, but the depths, being irregular, from 8 to 11 or 12 fathoms in some places, cannot be implicitly relied on as a guide; this is particularly the case near and eastward of the Four Fathoms banks, eastward of the banks extending from Menjangan point, and also in the vicinity of Arend and Five Fathoms banks. It will be prudent to keep towards the Sumatra coast if the depths increase to 12 or 13 fathoms; and to haul off from it if they decrease to 8½ or 9 fathoms.

Northward of Arend bank the coast may be approached with greater safety, observing that the bank, with less than 3 fathoms fronting it, extends about 14 miles off. It may, however, be approached by the lead to 5 fathoms.

The trees between Bungin and Serdang points and the groups on the north-west side of Menjangan point, are the highest landmarks on this coast, but they should not be in sight from the deck, as abreast both points shoals extend about 14 miles off. These trees afford some guide from aloft during the westerly monsoon, which is the clear season, but would not be visible during the easterly monsoon, except on rare occasions.

If the position of the vessel is uncertain at night, or in thick weather, it is advisable to anchor, for the depths are moderate, and the bottom good, being mud, or mud and sand.

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Chart, 2,149 [2,548]. Var. 0° 45′ E.

At night, steer to pass midway between Swallow bank and Jason rock, and for North Watcher light when bearing about N.E. by E. Jason rock lies about 2 miles within the range of visibility of the light in clear weather. From abreast the light, course can be shaped for Banka strait, &c.

From northward to Sunda strait.—Steam-vessels and sailing vessels with a fair wind, after passing eastward of Five Fathoms banks, in depths of from 10 to 12 fathoms, steer for the passage between Two Brothers and North Watcher. In the eastern monsoon, when the atmosphere is hazy and the coast rarely visible, great care is necessary in passing Two Brothers, which from northward appear as one.

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CHAPTER VII.

BANKA STRAIT—AND NORTH-WEST AND NORTH COASTS OF BANKA ISLAND.

General Description. — Aspect. — Banka strait separates Banka and Sumatra islands, and from its southern entrance trends with many bends to the north-westward. It is available for all classes of vessels. Charts, 2,149 [2,548], 2,597 [2,551], 2,808 [2,552], 3,471 [2,549]. Var. 0° 40′ E.

The south entrance to Banka strait is encumbered with numerous banks of sand, having deep channels between; only two of which, however, viz., the Stanton and the Lucipara, are available for the ordinary purposes of navigation; both are buoyed; the Stanton is also lighted and is available for light or moderate draught vessels at night. The Lucipara channel is only available by day, for vessels of moderate draught.

The coast of Sumatra, forming the west side of Banka strait, is very low, densely covered with wood, and offers no other variation than a few points, which are only clearly distinct at short distances, and are easily mistaken for the so-called False points, which are observed immediately after rounding the real points. The whole coast is bordered by a mud flat, which is narrower off the points, but in some of the bights is from 2 to 6 miles wide, with depths of less than 3 fathoms. Towards the Banka side the bottom becomes gradually harder, and even rocky.

Banka island, forming the east side of Banka strait, has numerous hills and mountains, varying from 900 to 2,600 feet in height; and it is remarkable that, notwithstanding their comparatively small height, their summits are generally covered with clouds. On the Banka coast are prominent points, sandy beaches, and in some places deep bights, as on the Sumatra side; as a rule, wherever sand occurs, casuarina trees will be found; the other trees are principally pine, teak, and aspen. Near the western point of Banka stands Muntok, the capital of the colony (or residency) of Banka. (*See* page 480.) Lat. 2° 4′ S. Long. 105° 10½′ E.

Besides the few small islets and rocks in Banka strait, there is the group of Nangka islands, where sailing vessels sometimes proceed to procure fresh water and firewood. Many rivers discharge themselves into the strait, of which the principal are the Sunsang and the Banju Asing, in Sumatra, both navigable to a considerable distance.

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Charts, 2,597 [2,551], 2,149 [2,548], 3,471 [2,549]. Var. 0° 40′ E.

Winds.—The winds in Banka strait follow the direction of the coasts, though with slight variations from the influence of the land and sea breezes; and fresh breezes may always be expected when working against the monsoon. During the latter part of the south-easterly monsoon it frequently blows hard from the south-west. Land breezes occur at night. (*See* winds, page 30.)

Lat. 2° 4½′ S. Long. 105° 8′ E.

Tides.—The tides have a strong diurnal character predominating, with semi-diurnal irregularities. Near tanjong Kalian the diurnal tides make high water about 10 hours in the morning on 1st January and about 2 hours earlier in each of the following months. The average rise at springs is 10 feet, but towards the second half of June and December the rise is nearly 12 feet, the average neap rise is 3 feet; in both the above tides highest water is reached fully 2½ days after the moon's greatest declination.

The semi-diurnal tides occur 2 days after full and change of the moon, with high water at 8 hours, and a rise of 2½ feet, neaps, at a similar time after the quarters of the moon, with high water at 2 hours and no rise.

Lat. 2° 52¾′ S. Long. 106° 8½′ E.

Near pulo Besar the high water of the diurnal tides is at the same hour as at Kalian point, springs occurring half a day earlier; the average rise of springs and neaps are 8 and 2 feet respectively, increasing in the second half of June and December to 9 and 3 feet, and decreasing, in the second half of March and September, to 7 feet and one foot.

Semi-diurnal tides occur nearly 5 days before full and change of the moon, with high water at about 2 hours, and a rise of 2 feet; neaps, at a similar time after the moon's quadratures, with high water at 8 hours and no rise.

Tidal streams.—The tidal streams in Banka strait are strong but irregular, and are greatly influenced by the monsoons. The flood stream enters the strait at both ends, meeting near the Nangka islands. The direction of the streams is influenced by the windings of the strait, forming at their meeting, whirls and eddies in the bights.

Near pulo Besar the stream of the diurnal tide has an average rate of less than a knot an hour and sets N.W. at about 1st January, from 7 hours in the evening to 7 hours in the morning, becoming about 2 hours earlier in each of the following months.

The S.E. going stream, about 1st January, runs from 7 hours in the morning to 7 hours in the evening, becoming about 2 hours earlier in each of the following months.

Three days after the moon's greatest declination these streams have a rate of 1½ knots and, at the same period after the moon has no declination, a rate of a quarter of a knot.

General chart, 2,149 [2,548].

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Charts 2,597 [2,551], 2,149 [2,548], 3,471 [2,549]. Var. 0° 40′ E.

The semi-diurnal streams have an average rate of one knot an hour and set S.E. at full moon, from 5 hours in the afternoon to 11 hours in the evening; and at the change of moon, from 5 hours in the morning to 11 hours in the morning. At the moon's quadratures they run from 11 hours in the evening to 5 hours in the morning, and from 11 hours in the morning to 5 hours in the morning with a rate of about three-quarters of a knot. During the remaining period the stream runs N.W.

The S.E. stream of the monsoon from December to March is more uniform and has a greater rate than that to the N.W. from May to October.

The greatest rate of the S.E. going stream, which attains 4 knots, occurs about February at full and change of the moon, about 3 days after the moon's greatest declination, and the greatest rate of the N.W. going stream, which is the same, about full and change in June at a similar period.

Lat. 2° 4½′ S. Long. 105° 8′ E.

Near tanjong Kalian the principal stream is from the diurnal tide and runs to the N.W. about 1st January from about 10 hours in the morning to 10 hours in the evening, becoming 2 hours earlier in each of the following months.

The S.E. going stream, about 1st January, runs from about 10 hours in the evening to 10 hours in the morning, becoming 2 hours earlier in each of the following months.

The average rate is fully 1½ knots an hour, and the stream is strongest (about 2½ knots an hour) at 2½ days after the moon's greatest declination, and is weakest, with a rate of three-quarters of a knot, at a similar period, after the moon has no declination.

The semi-diurnal streams have an average rate of one knot, and run to the S.E. 3 days after full and change of the moon from 2 to 8 hours in the afternoon and 2 to 8 hours in the morning respectively, with rates of 1¼ knots to half a knot; during the remaining periods the stream sets N.W.

From May to November, during the south-east monsoon, an uninterrupted stream runs to the N.W. with a rate of fully half a knot, afterwards diminishing in strength from December to March, during the north-west monsoon, till it becomes imperceptible.

The south-east going stream attains its fullest strength of nearly 4 knots, 2½ days after the moon's greatest declination, about 1st January at 5 hours in the morning, and about 1st July at 5 hours in the afternoon, the rate amounting to scarcely 3½ knots.

In the northern portion of the strait, a constant stream to the N.W., increased in the south-east and decreased in the north-west monsoon,

General chart, 2,149 [2,548].

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Charts, 2,597' [2,551], 2,149 [2,548], 3,471 [2,549]. Var. 0° 40' E.

does not run near tanjong Kalian, but it appears that a constant stream sets to the S.E.

In the southern portion, on the Sumatra shore, the monsoon stream runs oftener to the S.E., in the north-west monsoon with doubled and in the south-east monsoon with little strength.

During the south-east monsoon tidal rips arising from the meeting of the streams, extend across the strait from Nangka island.

On the Banka side, from December to March, there is no considerable stream near tanjong Kalian, but further in the strait there is a continually predominating stream to the S.E.; on the Sumatra side, there is a considerable stream to the S.E. all the year round, which, however, runs with more strength from December to March than from May to November.

Sailing vessels should therefore work on the Banka side during the north-west monsoon, where, as a rule, the wind is northerly, and on the Sumatra side, during the south-east monsoon.

Eddies.—When working through the middle of the strait during the strength of either monsoon, a continuous and contrary current is certain, and the skilful seaman will therefore find great advantage in availing himself of the eddies, as well as of the more regular changes of stream, by standing into the bights in those parts of the strait where he can safely approach the land.

In Toboali channel, also in the bay north of Nangka islands, and in the passage between Karang Brom Brom and Banka, even in the north-west monsoon, there is a regular succession in the roadstead tides. It has been often observed, when passing Muntok road, that the vessels were lying with their heads in a contrary direction to those at anchor upon the bank outside. In that road the flood comes from the westward, and the ebb from the eastward; but near the mouth of Sungi Banju Asing the contrary occurs; the flood there runs west and the ebb east. In the bays between First and Second points, and again between Third and Fourth points, there are probably eddies of which vessels of light draught may make use, and heavier vessels may no doubt, in many places, run close enough to the shore to keep out of the influence of the tidal streams.

Lat. 1° 54' S. Long. 104° 48' E.

Freshets.—Between Batakarang and Fourth points, after heavy rains, the ordinary stream is considerably accelerated and diverted by the freshets from the many rivers in this vicinity, in the direction of Kalian point, until it reaches mid-channel, to be carefully guarded against in the night.

General chart, 2,597 [2,551].

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CAUTION.—The buoys and beacons in Banka strait are not to be entirely depended on. Charts, 2,597 [2,551], 2,149 [2,548]. Var. 0° 40′ E.

WESTERN SHORE.—Lucipara island, 164 feet above high water, at the southern entrance of Banka strait, and 9 miles eastward of Lucipara point, is half a mile in length, a quarter of a mile in breadth, and covered with trees, the tops of which are visible in clear weather from distances of 14 or 15 miles. It is surrounded by a reef, which from its south-east end extends about one mile, has several rocks on it, and covers at half tide; around this reef is a bank, with from 2½ to 3 fathoms water over it, extending about one mile to the northward from the island, and 1½ miles south-eastward of it. Chart, 2,808 [2,552]. Lat. 3° 13′ S. Long. 106° 13½′ E.

Eastward of the south point of this bank there is a reef with 2½ fathoms water over it.

COAST.—Lucipara point, which forms the south-western limit of Banka strait, is covered with trees, the tops being about 90 feet above high water.

The coast between Lucipara and First points, a distance of 14 miles, is formed of mangrove jungle, and was found in the survey of 1859 to have extended considerably.

The Dutch naval surveying officers state that the whole coast of Sumatra facing Banka strait, wherever mangrove is found growing, is progressing outwards. This remark applies to the bays, and more especially to the outlet of rivers, but not to First, Second, and the other principal points, where a different kind of tree will be found, and the rapid current sweeping round these abrupt points prevents any further extension taking place.

Green point, so named from the trees on it being of a lighter and brighter green than elsewhere, lies 10 miles northward of Lucipara point, the coast between forming a bight. Between these points is a ridge of high trees standing about 1½ miles back from the coast line.

First point lies 4 miles northward of Green point, the coast between forming a bight. The trees on it are about 60 feet high, and present a level appearance. Lat. 2° 59′ S. Long. 106° 3′ E.

Between First point and Second point is False First point, on which the trees are 105 feet high; First bight, westward of it, is about 4 miles deep. Chart, 3,471 [2,549].

Mud bank.—Southward of Lucipara point, the 3-fathoms edge of the mud bank which fronts the whole coast of Sumatra is about 14 miles off-shore; off the point it is reduced to about 2 miles, which

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Chart, 3,471 [2,549]. Var. 0° 40′ E.

is further reduced off Green point to a little over one mile; abreast of First point, it is distant half a mile, and off False First point about two-thirds of a mile.

From about 10 miles southward of Lucipara point, to within 2 miles of Green point, the depths decrease regularly towards the mudbank; but just southward of, and fronting Green point, the water shoals suddenly from 6 to 3 fathoms, and therefore this part of the flat should never be approached into less water than 7 fathoms. Near First point the bank is also "steep-to," and should not be approached under 12 fathoms.

The mudbank projects two-thirds of a mile from False First point and 3½ miles from the shore in the centre of First bight, between False First point and Second point. It is "steep-to," and should not be approached under a depth of 12 fathoms near the points, nor under 10 fathoms in the bight.

Lat. 2° 41′ S. Long. 105° 47′ E.

Second point (Tanjong Tapa).—On this point the trees are about 80 feet high; between it and Third point, distant 20 miles, the coast forms Second bight, which is about 6 miles deep.

The mudbank between Second and Third points which fills the bight, with the 5-fathoms contour line 7½ miles off its centre, should be given a wide berth, as it shoals suddenly; Second point, bearing S.S.E., leads clear of all but the southern part of it.

Lat. 2° 23′ S. Long. 105° 37½′ E.

Third point (Tanjong Kesugian), a round point, 20 miles north westward from Second point, is 78 feet above high water. About 2 miles westward is the entrance of Sungi Kesugian, which is said to connect with one of the rivers leading to Palembang; thence the coast trends westward to Fourth point.

The mudbank does not extend more than half a mile off Third point, but it is "steep to," and should not be approached under three-quarters of a mile, or in less than 13 fathoms water.

Between Third and Fourth points the bank is straight, its edge being from one mile to 2 miles from the shore. The depths between these points are irregular, but vessels may, with attention to the lead, stand towards the bank into a depth of 7 fathoms, until nearly abreast of Fourth point, where the bank is steeper.

LIGHT BUOY.—A buoy, painted white, and exhibiting a *white occulting* light *every twenty seconds*, which shows light for *ten seconds* and is eclipsed for *ten seconds*, is moored off Third point.

Lat. 2° 19¾′ S. Long. 105° 13¼′ E.

Fourth point (Katima Bongko), 23 miles westward from Third point, has trees upon it about 112 feet high.

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The coast from Fourth point stretches westward for about 22 miles, and in this space is more or less covered with high trees, standing in the water at high tide, and here the different rivers leading to Palembang fall into the strait. Chart, 3,471 [2,549]. Var. 0° 40′ E.

The mudbanks from Fourth point trend in a west-north-west direction for 18 miles, thence south-south-westward, forming one side of the entrance to Sungi Sunsang; a spit projecting from the land forms the other side of the entrance to that river, as also the south-east side of the entrance to Sungi Banju Asing.

CAUTION.—This bank, for 6 miles westward of Fourth point, is composed of hard sand, covered with a thin stratum of soft mud; being "steep-to," many vessels have grounded upon it. The lead cannot at all be relied upon for giving warning in time to avoid it, for a depth of 11 fathoms may be obtained immediately before grounding. The safest plan is not to pass Fourth point within 3 miles, and to preserve that distance from the edge of the bank.

The depths, however, become more regular off the mouths of the Palembang rivers, and towards and abreast Batakarang point.

Great care, however, is requisite in navigating this part of the strait during the rainy season, for large drifts (floating islands, composed of trees and other vegetable matter) are then brought down these rivers by the freshets, which set strong over to the west end of Banka; and as, at spring tides, the flood runs strongly into them, a vessel may be driven too near either shore, both sides of which are fronted by dangers.

Off-lying banks.—A bank about 2 miles in length, in a west-north-west and east-south-east direction, and three-quarters of a mile in breadth, with a least depth of $4\frac{1}{4}$ fathoms, over hard ground, lies about 8 miles eastward of Fourth point, and nearly 3 miles from the shore.

A bank of sand and shells, having $4\frac{3}{4}$ fathoms water, lies 4 miles north-east of Fourth point, with depths of 7 to 9 fathoms between.

A patch of 6 fathoms lies $6\frac{1}{4}$ miles north-east of Fourth point.

SUNGI SUNSANG or PALEMBANG RIVER.—At about 18 miles westward of Fourth point is the main entrance of Sungi Sunsang, navigable for vessels that can cross the bar as far as Palembang, a distance of 54 miles from the lightship. Sungi Saleh and Sungi Upang, the two eastern mouths, are not navigable. The main entrance is upwards of a mile wide, with a depth of 9 feet at low water, and 21 feet at high water, spring tides; within it is contracted in some places to the width of a cable by the different islands and banks, until close to the town of Palembang.

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Chart, 3,471 [2,549].
Lat. 2° 11¼′ S.
Long. 104° 57′ E.
Var. 0° 40′ E.

LIGHT VESSEL.—A light vessel, painted black, with two masts, and *Palembang* lettered on the sides, is moored at the entrance of the river, and exhibits, at an elevation of 42 feet above the level of the sea, a *white fixed* light, which, in clear weather, should be visible from a distance of 13 miles.

Lat. 2° 21¾′ S.
Long. 104° 54½′ E.

LIGHTS.—A *white fixed* light is exhibited at Sunsang village, and *red* and *white fixed* lights indicate the channel in the river.

LIGHT BUOYS.—Buoys.—The mouth of the river is beaconed on the starboard hand entering by 3 conical buoys, painted white, and on the port hand by 5 can buoys, painted black.

Also on the starboard hand entering there is a light buoy, painted white, exhibiting a *white fixed* light, which should be visible, in clear weather, from a distance of 6 miles.

A light buoy, painted white, exhibiting a *white occulting* light with a period of system of *twenty seconds* and showing light for *ten seconds* followed by an eclipse of *ten seconds*, is moored with Sunsang light structure bearing S.W. ½ W. distant one mile.

On the port hand, nearly a mile northward of pulo Payung, a light buoy, painted black, exhibits a *white occulting* light, which should, in clear weather, be seen from a distance of 6 miles.

On account of the many floating trees and strong freshets the buoys must not be depended upon.

Tide gauge.—Near the outer white conical buoy and N. ⅓ E. distant 4 miles from tanjong Charat Alangan, there is an iron pile tide gauge, which has at its upper end a cylinder, the under side of which indicates the height of high water or spring tides.

Under this are five half cylinders, each one foot in length and one foot apart.

At high-water, spring tides the upper cylinder is thus alone visible; when the five half cylinders can be seen, the tide will be at least 10 feet below this level.

Depths.—At the entrance to the river there is a depth of 9 feet by the black buoy on the east, and a depth of 10 feet near the white buoy, on the west side, and from 11 to 30 feet in the channel. Southward of the inner black light buoy a bank extends in a southerly direction to pulo Payung, and the channel then lies on the eastern side of that island, with depths of from 3 to 5 fathoms.

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Chart, 3,471 [2,549].
Var. 0° 40′ E.
Lat. 2° 58¾′ S.
Long. 104° 47½′ E.

At Palembang the river is about a cable in breadth with depths of from 7 to 9 fathoms.

The depth in the river just to the northward of its junction with the Salat Jaran is 12½ feet at low water, spring tides, and the rise amounts to 10½ feet.

The river is navigable for vessels as far as the town of Palembang, and both sides are wooded; on nearly all the isolated banks there are small trees, and on others fishing stakes, consequently there will not be much difficulty in avoiding them.

LIGHT BEACONS.—The channel near Salat Jaran is marked by two sets of beacons, one on either bank of the river. In each case the front beacon shows a *white fixed* light, and the rear beacon a *red fixed* light, and kept in line lead in the channel. Other beacons, exhibiting *white fixed* lights, stand on certain parts of the banks between Salat Jaran and Palembang.

Each set consists of two beacons painted white.

Tidal signals.—The following tidal signals are made from the light vessel:—

By Day—A white flag with a black cross, hoisted under a blue flag, indicates—Flood tide.

A white flag with a black cross—High water.

A blue flag—Low water.

A white flag with a black cross above a blue flag—Ebb tide.

By Night—Three *white* lights, forming a triangle, apex upwards—Flood tide.

Three *white* lights, placed vertically—High water.

Three *white* lights, placed horizontally, close together—Low water.

Three *white* lights, forming a triangle, apex downwards—Ebb tide.

Freshets.—From November to March, during the north-west monsoon, rains prevail, and the wind varies from N.W. to N.E. At this season, sailing vessels, belonging to Palembang, either remain in port or trade to other places, as it is then almost impossible for them to make any progress up the river against the freshets. During a stay of five days off the town in January, the influence of the flood was not once felt. The ebb slackened during the day, but at night it often ran 5 knots. After much rain the freshets out of the river are felt as far as Muntok bay. (*See* Rainfall, p. 33.)

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Chart, 3,471 [2,549].
Lat. 2° 58¾′ S.
Long. 104° 47½′ E.
Var. 0° 40′ E.

Palembang, one of the largest Malay towns in the Archipelago, and the largest in Sumatra, derives its name from the many bridges across the numerous creeks that intersect it. A Dutch Resident and other officials reside here, and to support their authority there is a military force. The population of the town in 1900 was 57,261, which included 309 Europeans, and the climate in the vicinity is considered so salubrious that convalescent soldiers are sent here from Banka.

Near the extreme end of the town, commanding the mouth of the Ogan river, is a large fort ; there are several smaller forts some distance up the river.

Covered boats (named bedahs) daily arrive from the interior laden with large supplies of cotton for exportation. This useful article grows quite wild some distance up the river, in some places close to the stream, and covering many miles of land ; the greater portion of it is sent to Batavia.

Communication.—The steamers of the Royal Netherlands Packet Company run between Palembang and Batavia every week, touching at Muntok, and there is fortnightly communication by the same steamers with Muara Saba, Simpang, and Jambie ; telegraphic communication with Batavia and Sumatra ports. (*See* Chapter I., page 21.)

Palembang is in connection with the Java sea southward of Lucipara point by creeks leading to the Lumpur and Masuji river, available for small trading craft. (*See* those rivers.)

Supplies.—All the necessaries of life are here found in abundance. The country abounds in large game, deer, wild pigs, &c., and the river with fish. Beef, fruit, vegetables, &c., are cheap and plentiful.

Trade.—The exports, the principal of which are cotton, guns, ivory, gutta percha, coffee, pepper, tobacco, &c., in 1902, were valued at 7,061,000 guilders, and the imports at 5,627,000 guilders, and in the same year 154 vessels, with an aggregate tonnage of 75,965 tons, entered the port.

Tides.—At the lightship springs rise 10 feet, neaps 5 feet ; at Sunsang springs 12 feet, neaps 4 feet ; at Upang, 23 miles up the river and where there is a tide pole, springs rise 11 feet, neaps 3 feet, and at Palembang springs rise 10 feet and neaps 3 feet. It is high water at Upang 2 hours later than at Sunsang, and at Palembang 4 hours later. The ebb runs at a rate of 2 knots and the flood at rates of from one knot to 1½ knots an hour.

Lat. 2° 11′ S.
Long. 104° 55½′ E.

SUNGI BANJU ASING is more than a mile broad at its entrance, westward of the light vessel, where there are depths of from 8 to 10 fathoms in mid-channel ; but southward of tanjong Api api the centre of the river is encumbered with shoals.

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The river northward of Rimau island is known as Telok Tebing Tingi, that river branching off to the westward 8 miles south-westward of tanjong Api api, having at its head the Lalang and Chalet rivers. Chart, 3,471 [2,549]. Var. 0° 40′ E.

The southern branch, or Sungi Banju Asing, communicates with Palembang by the Jarang river, and its principal tributaries are the Chungkal and Dawas rivers, the former with depths of from 3 to 8 fathoms and 50 to 60 yards in width, and the latter with 2¼ to 8 fathoms and 30 to 40 yards in width.

LIGHT BUOYS.—A light buoy, exhibiting a *white occulting* light, with a period of system of *thirty seconds*, showing light for *ten seconds* and eclipsed for *ten seconds*, is moored at the south point of the bank and S.W. ½ S. distant 6¾ miles from tanjong Api api. A patch, with 8 feet water over it, lies N.E. ⅞ E. distant one mile from the buoy. Lat. 2° 22½′ S. Long. 104° 46¼′ E.

A light buoy, painted black, and exhibiting a *white occulting* light with a period of system of *twenty seconds*, showing light for *ten seconds* followed by an eclipse of *ten seconds* is moored 1¼ miles north-eastward of tanjong Sereh.

Buoys.—A conical buoy, painted white, and surmounted by a ball, is moored at the northern end of the middle bank, 1½ miles northward of tanjong Api api.

About 4 miles south-south-westward of this buoy a similar one is moored on the east side of the bank.

A can buoy, painted black, marks the southern side of the channel of Telok Tebing Tingi.

Directions.—Having passed about 1½ miles westward of the light-ship of the Palembang river, tanjong Api api should be steered for S.W. ¾ S., and as that point is approached, a more westerly course may be taken to pass between the point and the white buoy on the north end of the middle bank, then keeping along the eastern shore of the river at a distance of 4 or 5 cables.

The least water in this channel is 3½ fathoms at low water, spring tides, near the light buoy. If bound into Telok Tebing Tingi, and having passed southward of the white light buoy, steer to pass northward of the black light buoy, and follow the northern shore at about 1½ cables distant in a least depth of 2½ fathoms.

The Lalang river has at its mouth depths of from 3 to 3½ fathoms and a breadth of nearly 4 cables, but past its first bend there is a shoal with 12 feet water over it; higher up the water is deep.

If proceeding for the Pontian or Jarang rivers with a flood tide, keep on the eastern shore, as the stream runs with force past the entrance to the Pontian channel; taking care, at the same time, to avoid the shoals

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Chart, 3,471 [2,549]. Var. 0° 40′ E.

which surround the point. In this river care is necessary when passing the points, as from most of them project small mudbanks.

The Jarang river is from 50 to 80 yards in width and has depths of from 3 to 8 fathoms.

Tides.—At tanjong Api api springs rise 12½ feet; at the entrance of Telok Tebing Tingi, 12 feet, and at the mouth of the Lalang river 11½ feet.

Pontian and other affluents. — The junction of Pontian, Kietjar, Gassing, and Sebaliek rivers, which last unites Pontian to Jarang river, causes a part of the ebb to run from the first two rivers, through Sebaliek, and compels sailing vessels, having come so far with the flood, to anchor and wait for the ebb.

Pontian river is generally deepest on its western side, except near its mouth, where the greatest depth is in the middle; but again towards the western side, higher up, and in front of the shoal off the point, between Kietjar and Sebaliek rivers. When near its junction with Sleino and Jarang rivers, keep close to the eastern shore, in 6 to 8 fathoms, to avoid the reef which projects from the point between Sebaliek and Jarang.

When there is no wind it is necessary to anchor and wait for the flood coming up by Sleino river, in order to proceed up Jarang, and it will be found that a great part of the flood goes into Tambangadin river, while that going up Jarang is very trifling. Having reached Jarang Kechil, anchor again till high water, to wait for the ebb from this river, which will soon take the vessel into the Palembang. Remarks on the freshets (page 463) apply also to these.

Jarang bank.—The bank off Jarang river is very shallow, but on the north side there is a narrow passage with 5 or 6 fathoms. Vessels of less draught than 15 feet can also find a passage on the south side.

Lat. 1° 59½′ S. Long. 104° 48′ E.

COAST. — Batakarang point, the north-west boundary of Banka strait, lies about 30 miles north-westward from Fourth point, and may be identified by a group of trees, 130 feet high, which gives it a bluff and jagged appearance. Valsche or False point is more sloping and flat, and lies about 9 miles to the south-eastward of Batakarang point.

The mudbank projects 7 miles northward from Batakarang point, 4 miles north-eastward of it, and 2 miles off Valsche point; thence trending south-westward, bounding the entrance of Sungi Banju Asing on its north-west side to tanjong Kampeh, from which it projects not quite a mile.

The soundings off Batakarang point are regular, and the point may be passed in from 5 to 6 fathoms water.

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EASTERN SHORE OF BANKA STRAIT.—The south coast of Banka, which separates Banka and Gaspar straits, being intimately connected with the former, is here described, as it has been observed that at the entrance of Banka strait, in the south-east monsoon, the ebb stream during the night at spring tides sets to the south-eastward, and consequently many vessels, although steering a course for the strait, have been set between Dapur islands and tanjong Baginda.* Chart, 2,137 [2,550]. Var. 0° 50′ E.

The coast between tanjong Baginda and Dapur point, about 14 miles in length in a westerly direction, is generally low, and covered with trees; it presents, however, some points sloping down from hills of moderate elevation, and is fronted with a mudbank extending in places nearly 2 miles from the shore, upon which are many rocks, above and below water.

COAST.—Tanjong Baginda, the south-eastern extreme of Banka, is rocky, and slopes gradually in a south-easterly direction from Baginda hills, 521 feet above high water, one mile north-west of it. The point is fringed by rocks above and below water. Lat. 3° 5′ S. Long. 106° 45′ E.

Dua point, 2 miles south-westward of tanjong Baginda, is separated from it by a bight half a mile deep. At one mile within this point is a hill 432 feet above high water.

Tanah-robu point, 9 miles westward of Dua point, has several rocks, above and below water, projecting nearly a mile off.

Banks.—Rocks, some of which are above water, extend southward of Dua point and for more than a mile along the coast westward, to the distance of half a mile. The east end of a sandbank lies about 2 miles southward from Dua point, and extends westward, joining the mudbank which fronts the coast to the distance of one mile, as far as Tanah-robu point, where it terminates; on this sandbank are several rocky patches.

Belayer reef is above water, and lies on the outer edge of the bank just mentioned, and W.S.W. distant 1¾ miles from Keyang point.

Dapur or **Langang point** lies under Toboali Lama peak, and forms the south-western extreme of Banka. On the coast bank near Dapur point is a rock 40 feet above high water, with smaller rocks above water on both sides of it. Lat. 3° 7′ S. Long. 106° 31′ E.

From a distance of 7 to 10 miles the rocks on Dapur point appear like a large town, showing out white against the trees in the background.

Dapur islands, two in number, are about a cable in diameter, and connected at low water by rocks; they are situated about one mile from Dapur point, and form the south-eastern limit of the entrance to Banka strait. Both islands lie on a bank with less than 3 fathoms water over it,

General chart, 2,149 [2,548].

* For description of coast eastward of tanjong Baginda, *see* p. 500.

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Chart, 2,137 [2,550]. Var. 0° 50′ E.

and the southern one, 120 feet above high water, is fronted by a sandy beach; rocks above water lie about one cable to the southward, and a rock under water about 2 cables south-eastward of the islet. A bank extends about half a mile from the northern side of the islands.

There is a channel about 3 cables wide, with depths of from 6 to 7 fathoms between Dapur islands and point; thence to Nangka point there are several white rocks lying close to the shore.

Lat. 3° 8′ S. Long. 106° 31′ E.

LIGHT.—On the south-west side of the southernmost islet, an iron framework, 44 feet in height, attached to a stone dwelling painted white, exhibits, at an elevation of 129 feet above high water, a *white flashing* light with a period of system of *thirty seconds* showing a flash for *five seconds*, followed by an eclipse of *twenty-five seconds;* it should be visible, in clear weather, from a distance of 13 miles.

Banks.—The bottom, off the south end of Banka, is very irregular, and composed of long sand ridges, with deep water over a muddy bottom between. A long ridge, the western end of which lies S.E. by S. distant $1\frac{1}{3}$ miles from Dapur islands, extends about 5 miles to the eastward, and has several patches of $3\frac{1}{2}$ fathoms over a sandy ground.

At about $3\frac{1}{2}$ miles, E. by S., of the eastern extreme of this ridge, and separated by deeper water, is a bank with depths of 4 and $4\frac{1}{2}$ fathoms, over coral and sand, extending in an easterly direction for $2\frac{1}{4}$ miles; it appears to be a continuation of Dapur bank, and from its shoalest part tanjong Baginda bears N.E. $\frac{5}{8}$ N., distant 7 miles. An isolated patch of 5 fathoms lies midway between these ridges, and others will be seen on the charts more in the offing.

Overfalls.—At full and change, tidal rips and overfalls occur, caused by the meeting of the ebb stream from Banka and Gaspar straits over an uneven bottom.

Chart, 2,808 [2,552]. Lat. 3° 5½′ S. Long. 106° 30′ E.

TOBOALI BAY.—Nangka point, the south-east extreme of Toboali bay, lies 2 miles north-west from Dapur point, and the coast between is fronted by rocks extending about half a mile off shore. Toboali Lama, a hill of pyramidal form, 512 feet above high water, is situated $1\frac{1}{2}$ miles eastward of Nangka point. The 3-fathoms edge of the mudbank, nearly one mile off Nangka point, is "steep-to."

The point may easily be distinguished by a round hillock over it 264 feet above high water, and also by the land receding, forming Toboali bay, which, to Labu point, is 11 miles in width; the shore of the bay is low, and fringed at high water with sandy beaches within the mudflat.

Toboali point, 213 feet above high water, situated in the middle of the bay, and distant $5\frac{1}{2}$ miles north-westward from Nangka point, has several white rocks near it, and a conspicuous single tree on its summit.

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Toboali fort, with its red-roofed barracks, stands half a mile south-east of Toboali point, upon a mound 60 feet above high water, at the south point of entrance of a small river. A Dutch Administrator resides here, and a small military force garrisons the fort; there is also a hospital. At low water the river dries to a distance of 3 cables from its mouth. Chart, 2,808 [2,552]. Lat. 3° 0′ 48″ S. Long. 106° 27′ 25″ E. Var. 0° 40′ E.

Between Nangka point and Toboali point the 3-fathoms contour line is 2 miles from the coast, but facing the bight westward of Toboali point it is nearly 3½ miles off.

Sabang village is situated close to the fort, and contains a mixed population of about 600 Malays and Chinese.

Supplies.—Water and wood may be obtained here; the former from the river, or from a small stream half a mile eastward of it, from half flood to half ebb. Medical assistance may be obtained here by application to the Dutch authorities.

Hills.—Aspect.—Mount St. Paul, 5 miles within Toboali point, rises with a gradual acclivity on its south-eastern shoulder to a peak 990 feet above high water, with two others adjoining of nearly the same elevation; the western peak terminates rather abruptly in a lower spur in the direction of Gadong peak. When westward of Puni islet, owing to a projecting spur from the middle peak, the eastern peak of St. Paul is hidden, and the western one then appears the highest, and forms, with the north-west brow, a saddle hill.

Gadong peak is pyramidal, 593 feet above high water, and lies nearly 2½ miles westward from mount St. Paul; it is a good landmark.

Gosong point lies 4 miles north-westward of Toboali point, the land between forming a deep bight with mangrove trees. A stream falls into the sea on the north side of the point.

From Gosong point to Labu point the land is more elevated, the highest part being 250 feet above high water, with rocky points and sandy beaches, between which are numerous rocks close to the shore.

Puni islet, lying midway between Gosong and Labu points, is small, 47 feet above high water, and conspicuous from the white granite rocks forming its base, and other rocks of a similar appearance near it.

Labu point, 255 feet above high water, and distant 12 miles north-westward from Nangka point, may be considered as the western extreme of Toboali bay. A hill, 250 feet above high water, lies about one mile eastward of it, and another, about the same height, the same distance northward. This point from the south-eastward presents a shelving appearance, with large white rocks extending from it; from the Lat. 2° 58′ S. Long. 106° 20′ E.

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Chart, 2,808 [2,552]. Var. 0° 40′ E.

westward these rocks have the appearance of a village, from the contrast they offer to the green verdure of the point.

The anchorage in Toboali bay is off the fort in 4 fathoms water over mud, with Toboali Lama peak bearing S.E. by E. ½ E., and Gadong peak in line with the fort N.E. ⅔ N.; small craft may approach on the latter bearing nearer the shore as the soundings decrease regularly. This latter bearing also leads into the anchorage, from Stanton channel, southward of the banks. In southerly and south-westerly winds there is a heavy swell here which makes landing difficult.

DAWON POINT is situated 7 miles north-westward from Labu point, the shore between being low and covered with mangroves; a range of hillocks extends parallel to the coast, the highest of which is 230 feet above high water; there are also several streams.

The land at Dawon point attains a greater elevation, and is faced with sandy beaches and rocky points. At 4½ miles within the point is a round wooded hill, 315 feet above high water.

Sail tree.—Close to the coast, 2 miles northward from Labu point, is a clump of trees, one of which (Sail tree) is or was a conspicuous square tree, 167 feet high, there being no others of the same elevation near it.

Pulo Dawon, 30 feet in height, is one of a cluster of rocks lying off Dawon point, nearly all of which are covered at high water.

Lat. 2° 54′ S. Long. 106° 13½′ E.

LIGHT.—On pulo Dawon, from an iron framework, 44 feet in height, attached to a stone dwelling, painted white, a *white fixed* light is exhibited at an elevation of 44 feet above high water, and should be visible, in clear weather, from a distance of 10 miles.

Panjang hill rises close to the coast between Dawon and Banka points. When seen from the south-eastward it shows as a wedge, with its greatest elevation, 316 feet above high water, on the eastern end. From the north-westward it appears as a long hill rising to a peak near its centre. The coast between Panjang hill and Banka point is low and covered with mangroves, off which there are several ledges of rocks.

Water.—A stream of fresh water runs close to the north side of this hill.

Banka point and hill.—Banka point is about 60 feet above high water, and at 1½ miles northward of it is Banka hill, which from the south-eastward appears of similar shape to Panjang hill, but differs in having the highest part on its western extremity. From the north-westward it shows with a flat top, and is about 256 feet above high water.

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PULO BESAR, nearly connected with Banka point by rocks, is one-third of a mile in extent. Chart, 2,803 [2,552]. Var. 0° 40′ E.

LIGHT.—On the centre of pulo Besar, an iron framework tower 202 feet in height exhibits, at an elevation of 196 feet above high water, a *white group flashing* light showing groups of two flashes every *twenty seconds*, thus: flash, *one and a half seconds;* eclipse, *one and a half seconds;* flash, *one and a half seconds;* eclipse, *fifteen and a half seconds;* it should be visible from a distance of 20 miles in clear weather, but is obscured by Lalari point when bearing southward of S. 74° E. Lat. 2° 52¾′ S. Long. 106° 8½′ E.

The keeper's dwelling is stone, the lower half painted white and upper half brown.

Coast.—From the foot of Banka hill, the coast trends westward to Lalari point, is marshy and covered with mangrove trees, and assumes the usual irregular outline of such coasts. The trees upon Pudi point, nearly midway, form two mounds, with a small gap between them.

Mamelon hummock, standing by itself 3 miles northward of Pudi point, is a small round hill 256 feet above high water.

LALARI (Pangong) point, 75 feet above high water, is covered with trees, and presents a bold bluff appearance on all bearings in the strait, and has a clean sandy flat near it. Chart, 3,471 [2,549]. Lat. 2° 49′ S. Long. 105° 5¾′ E.

Anchorage. — Good anchorage may be obtained, in about 7 fathoms water, over mud, with Lalari point bearing S.E. ½ E., and Brani point N. ⅝ W.

Mudbank.—A mudbank fronts the whole coast between Dapur and Lalari points. The 3-fathoms contour line may be considered to mark its edge, which, in most places, shoals very quickly within that line. It extends from a half a mile to one mile off the points, from 2 to 3 miles off the bights, and being "steep-to," should not be approached within a depth of 10 fathoms.

Between Toboali and Labu points are several narrow isolated banks about 2 miles in length, with depths of from 2 to 3 fathoms, lying parallel to and nearly midway between the shore mudbank and the sandbank forming the eastern limit of Stanton channel.

Tanjong Mentigi (Casuarina), 123 feet above high water, lies nearly midway between Lalari and Brani points. The coast between is low, for the first part marshy, and has sandy beaches at high-water mark; several hills, from 300 to 400 feet above high water, are situated from 3 to 4 miles inland. The mouth of the Sungi Kubal, about three-quarters of a mile northward of the point, is dry at low water at its entrance, but inside there is a depth of 2 fathoms.

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Chart, 3,471 [2,549].
Lat. 2° 38½′ S.
Long. 105° 53¼′ E.
Var. 0° 40′ E.

Brani point, 185 feet above high water and covered with trees, is 11 miles northward of Lalari point, and the termination of a spur from the Parmasang berg. One mile east-south-eastward of the point a conical peak, 516 feet above high water, shows very prominently both from the northward and southward.

Karang Tambaga (Copper rocks), are three small rocks, lying east and west of each other, about one cable in extent. The highest and westernmost rock is about 4 feet above high water, with Brani point bearing N. by E., distant 3 miles. A steep, hard bank, about half a mile in breadth, extends nearly half a mile northward of the group and 2½ miles to the southward, and has a least depth of about 2 feet over it; between it and the mudbank fronting the Banka coast are depths of from 5 to 9 fathoms.

Patches of coral and sand, about a cable apart, with 1½ fathoms least water over them, and 8 fathoms close-to, lie 1⅓ miles, W.N.W., from these rocks, but they are all within the 10-fathoms contour line, inside which depth vessels should not go when passing them. In approaching them the depths shoal suddenly from 20 to 10 fathoms.

From the middle patch with a depth of 2 fathoms, Karang Tambaga appear nearly in line with a sharp peak, 330 feet above high water, south of Bukit Limmaun, bearing E.S.E.; and the apex of Riah hill, 657 feet above high water, is just open westward of a white rock off tanjong Bedaau, N. by E. ½ E.

A rocky bank, about a mile in length in an east and west direction, and half a mile in breadth, having 7 to 9 fathoms water over it, and 14 to 20 fathoms close-to all around, lies W.N.W. of the shoal patches just mentioned.

LIGHT BUOY. — A buoy, painted black, and exhibiting a *white occulting* light, is moored off the western edge of the 2-fathoms patches; it has a period of system of *twenty seconds*, showing light for *ten seconds*, followed by an eclipse of *ten seconds* duration, and from it Second point bears W. ¼ S., distant 4¾ miles.

Clearing mark.—Lalari point, bearing S.E. ¼ S., leads westward of Karang Tambaga, of the shoal patches, and also just to the westward of the rocky bank.

Water may be procured from Sungi Bulan, a stream about 2 miles east-north-eastward of Karang Tambaga, from half flood to half ebb, after which the mud prevents a boat approaching near the shore.

Parmasang berg is a chain of hills extending from Brani point in a north-east direction for nearly 7 miles; the western summit rises to an elevation of 1,608 feet above high water.

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Tanjong Bedaau, a bold headland, 3 miles northward of Brani point, has a conspicuous white rock, 45 feet above high water, lying immediately off it. Chart, 3,471 [2,549]. Lat. 2° 35½′ S. Long. 105° 53½′ E. Var. 0° 40′ E.

Pulo Pemain, a small round island, 59 feet above high water, lies on the edge of the mudbank, 2 miles north-north-westward of tanjong Bedaau.

Tanjong Karra, 171 feet above high water, lies 3 miles north-eastward of tanjong Bedaau; rocks, some above water, extend more than half a mile off this point.

Slan bay is a deep shallow bight, about 9 miles across, in which are the Banka Kota and Slan rivers; the shores of the bay are marshy and covered with mangroves, with no firm ground, and only near the mouth of the Sungi Banka Kota is there some sandy beach.

Slan, the chief town of a district, is municipally governed by the administrator of the tin mines; here, as at all other chief towns of districts, a small number of Dutch troops are stationed.

Mudbank.—The edge of the shore mudbank lies nearly one mile off Lalari point, and a little less than half a mile off tanjong Mentigi and Brani point. Pulo Pemain stands on its outer edge, thence the bank, which abreast the middle of Slan bay is distant 5½ miles from the shore, assumes somewhat the form of that bay which it fronts, and surrounding Great Nangka island trends towards tanjong Tedong, from which it extends a little more than one mile.

Northward of Karang Tambaga the bank may be approached to a depth of 8 fathoms, as far as two miles northward of pulo Pemain, when vessels may stand into 7 or 6 fathoms until near Nangka islands, which should not be approached on the west side within the depth of 12 fathoms.

NANGKA ISLANDS, three in number, lie about the middle part of the Strait, 1½ to 3½ miles distant from the coast of Banka island, West Nangka being 8 miles eastward of Third point on the Sumatra coast. Great Nangka, 285 feet above high water, is 1¾ miles in length, in a north and south direction, by 1¼ miles in breadth; Middle and West Nangka are each about half a mile in length, the former being 125 feet, and the latter, on which is the lighthouse, 205 feet above high water. Plan, 2,149 [2,548].

Great Nangka is nearly half a mile within the edge of the mudbank which extends from the Banka shore. A rock, awash at low water, lies 3 cables west of the north point of the island.

From Middle Nangka, which consists of two islands joined by a sand ridge, a bank, with from 2 feet to 3 fathoms water over it, extends

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Plan, 2,149 [2,548]. Var. 0° 40′ E.

in a south-south-east direction for a distance of $1\frac{1}{3}$ miles; from West Nangka a bank, with from 2 to 3 fathoms water over it, projects southward nearly one mile; and south-south-east distant three-quarters of a mile from its extreme is a $3\frac{1}{4}$-fathoms patch.

Lat. 2° 23¼′ S. Long. 105° 45′ E.

A small flat rock, 6 feet above high water, named West reef, lies $1\frac{1}{2}$ cables off the west end of West Nangka; and another 32 feet above high water, named Tree rock, lies 3 cables south-eastward of Middle Nangka.

North reef lies 2 cables off the north end of Middle Nangka, with some rocks above water between, the mudbank extending in the same direction about a quarter of a mile beyond.

Between the banks which surround the islands are intricate channels from 2 to 4 cables wide, having depths of from 4 to 7 fathoms.

LIGHT.—On West Nangka a twelve-sided tower, 115 feet in height and painted white, exhibits, at an elevation of 215 feet above high water, a *white flashing* light, with a period of system of *half a minute* showing a *flash* for *three seconds*, followed by an eclipse of *twenty-seven seconds*; it should be visible from a distance of 20 miles in clear weather

Water.—There is a watering place on the west side of Great Nangka, where good water may be obtained and with a depth of 3 feet close to the shore; another and smaller stream runs out on the north-east side; but they are frequently dry during the south-east monsoon, and owing to the mudflats surrounding the islands, the watering places are difficult of approach by boats.

Anchorage.—The south extreme of Great Nangka bearing E. ½ N. leads about half a mile southward of the bank extending south-south-eastward of Middle Nangka; and Tree rock N. by W. ¼ W., leads westward of the mudbank off the west side of Great Nangka at nearly the same distance. A vessel can anchor, with both these bearings on, in 5 fathoms water, and be about $1\frac{1}{4}$ miles from the watering place; she should, however, approach this position with caution, and not attempt to go closer in.

Tides.—During the north-west monsoon it is high water, full and change, at Nangka islands at 7h. a.m., and the rise is $9\frac{3}{4}$ feet.

Tidal streams.—Southward of Nangka islands the flood stream sets to the northward and the ebb to the southward; northward of the islands flood and ebb streams set in the opposite direction.

Many eddies and small races will be met with in the vicinity of these islands, caused by the flood stream from the China sea meeting the flood from the southward. *See* also page 456.

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COAST.—Tanjong Tedong, lying about 2 miles northward from Great Nangka, is a conspicuous point 234 feet above high water. A large cluster of rocks, some above water, lie about one mile north-westward of the point, at a short distance within the edge of the shore mudbank. Chart. 3,471 [2,549]. Lat. 2° 21¼′ S. Long. 105° 48′ E. Var. 0° 40′ E.

The coast from tanjong Tedong trends north-eastward into a bay, at the bottom of which is the Sungi Sembilan, and here the shore is marshy and covered with mangroves; thence it curves north-westward to tanjong Penegan, from which it recedes about one mile to the entrance of a small river of that name. The coast line from this river rounds the foot of the higher land sloping down from Mundo peak and thence to Mundo point, when it again bends to the north-eastward for 2 miles to Sungi Mundo.

Pulo Mondong (Meddang) consist of four islands, three of which lie about 1¾ miles eastward of Mundo point, and form the south-western extreme of Mundo bay, being joined to the main land by the mudflat. The largest island is 147 feet, and the western, on which is some brushwood and trees, 40 feet above high water, and named Tree island. Pulo Mondo (Antu), the northernmost of this group, is 83 feet above high water, and lies about 1½ miles north-eastward of the other islands.

Mundo bay lies between Sungi Mundo and tanjong Batu Mensirah (Jurung-patt), 240 feet above high water, 8 miles north-westward. The shore of this bay is low, and covered with trees which, at the entrance of Sungi Kota Waringin, are about 120 feet above high water. The land near tanjong Batu Mensirah becomes more elevated, and continues so as far as the entrance of Sungi Jering.

Tanjong Raja and Sungi Tempelang lie between tanjong Batu Mensirah and tanjong Rensang. Close off the coast is pulo Simonbong (Sumbayang), 175 feet above high water, wooded and joined to the shore by a mud bank on which are large rocks at low water.

Jering bay is the deep bight, 8½ miles in width, between tanjong Rensang and tanjong Padah; at its head is Sungi Jering with Nuir village on the east side of its entrance. Tanjong Padah, 203 feet above high water, is readily recognised, the land on both sides being lower and curving into two bays, giving it a prominent appearance; the coast from tanjong Rensang to Sunji Jering is high with sandy beaches, but westward of the river it is marshy and covered with mangroves.

Tanjong Aniai (Anisi).—Between tanjong Padah and tanjong Puni, about 8 miles apart, there are two bays, each about three-quarters

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Chart, 3,471 [2,549]. Var. 0° 40′ E.

of a mile deep, separated by tanjong Aniai having a hummock 256 feet high water on it.

Tanjong Sukal, 2 miles eastward of tanjong Puni, has a hill 209 feet above high water, and a small stream on its west side.

Karang Saribu, a cluster of rocks, some above water, extend 2 miles, S. by E., from tanjong Aniai.

Lat. 2° 8¼′ S. Long. 105° 19′ E.

Tanjong Puni is low, and the coast line rounds away gradually on either side. Thence to tanjong Kalian, 11 miles west-north-westward, the coast recedes and forms Muntok bay, about 2 miles deep.

Landmarks.—There are several hills from 100 to 600 feet high on the part of the coast just described, between tanjong Tedong and Sungi Mundo; Mundo peak, 512 feet above high water, eastward of Mondong islands and the lighthouse on West Nangka, are convenient objects for determining the position of a vessel.

Lat. 2° 15½′ S. Long. 105° 49¼′ E.

Lat. 2° 4½′ S. Long. 105° 41½′ E.

At 3½ miles north-eastward from Tempelang river entrance is a hill 412 feet, north-westward of which is Tempilang or Bukit Pandan, 583 feet above high water, a useful mark when in this part of the strait.

Lat. 1° 57½′ S. Long. 105° 28′ E.

Bukit Asin (Assam), a solitary sharp peak, 661 feet above high water, standing by itself, 10½ miles northward of tanjong Padah, is also useful as a landmark.

Lat. 2° 1′ S. Long. 105° 17¼′ E.

Four miles inland between tanjong Puni and Muntok is Bukit Belu, 772 feet above high water, which serves as a clearing mark for Karang Brom Brom and Amelia bank; and 2 and 7 miles respectively north-eastward of Bukit Belu are Bukit Panjang and Bukit Batu, 761 and 708 feet above high water.

Lat. 2° 1′ S. Long. 105° 11′ E

Menumbing hill rises near the west end of Banka; its blunt summit being 1,525 feet above high water, may be seen at a considerable distance, and serves as a guide in approaching to or departing from the north end of Banka strait. It frequently happens that this hill is the only visible object, especially when a vessel is near the Sumatra shore in 5 or 6 fathoms water.

Mudbank.—The edge of the mudbank fronting the shore, with depths of less than 3 fathoms, extends a distance of one cable off the rocks off tanjong Tedong, and one mile beyond the Mondong islands. It also fills the whole of Jering bay, and extends about 2 miles southward of tanjongs Padah and Puni, whence it follows the curve of the coast line at an average distance of about 1¼ miles until abreast the point eastward of Muntok, from which it is distant only half a mile.

Between tanjong Tedong and tanjong Padah, the depths decrease regularly towards the shore bank, which may there be approached to depths of 5 or 4 fathoms, except near Mondong islands, where a vessel

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should not shoal under 5 fathoms. At tanjong Padah the bank begins to get "steep-to," and abreast of Karang Saribu there are depths of 9 and 10 fathoms close to its edge. Chart, 3,471 [2,549]. Var. 0° 55′ E.

Clearings mark.—Mundo peak, well open to the southward of Mondong islands, bearing E. ¾ S., leads southward of this bank, in 3½ to 4 fathoms water, as far westward of tanjong Padah.

The bank southward of tanjong Puni is shallow and "steep-to," having from 11 to 16 fathoms water, almost close to its edge. Tanjong Padah bearing E. by N. ¾ N. leads just south-eastward of this spit; and Menumbing hill, N.N.W. ⅞ W., leads just westward of it.

Karang Brom Brom is composed of rocks and sand, dry in places at low water, with one or more bushes growing on one spot; it lies 4½ miles southward from tanjong Sukal and is a little more than 2 miles in length in an east and west direction, and nearly half a mile in width. A small part of the reef on its western side is visible at high water, and here stands a conspicuous tree, forming a good mark, from which Menumbing hill bears N.W. ⅝ N.; from the eastern end a sand bank extends to a distance of a mile, with less than 5 fathoms water over it. Lat. 2° 12′ S. Long. 105° 20′ E.

Clearing mark. — The highest part of tanjong Anisi bearing N. ⅜ E., or the highest part of tanjong Padah bearing N.E. ¾ N., leads half a mile eastward of the shoal; and Bukit Belu, bearing N. ¾ W., leads the same distance westward of it.

A channel 1½ miles wide, having 7 to 14 fathoms water, lies between Karang Brom Brom and the shore mudbank. A sailing vessel may easily be worked through this channel by day, during the westerly monsoon, by taking advantage of the tidal streams, whereas on the coast of Sumatra a strong easterly stream runs with little interruption; it must, however, be borne in mind, when standing towards tanjong Puni, that the shore bank is "steep-to," there being depths of 11 to 16 fathoms close to its edge.

Amelia bank, a small patch of hard ground, with 2¾ fathoms water over it, and surrounded by depths of 3½ to 5 fathoms, at the south-east extreme of Muntok bank, is connected to the shallow patches of that bank by a ridge having 4 to 5 fathoms water. From Amelia bank the western extreme of Karang Brom Brom bears E. ⅛ N., distant 4½ miles.

LIGHT BUOY.—A buoy, painted red and black in horizontal bands, and exhibiting a *white occulting* light, with a period of system of *twenty seconds* showing light *ten seconds* followed by an eclipse of *ten seconds,* is moored near the south-eastern edge of the bank.

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Chart 3,471 [2,549]. Var. 0° 40′ E.

Clearing mark.—Bukit Belu bearing N. $\frac{3}{8}$ E. leads one mile eastward of Amelia bank; and the same hill N. by E. $\frac{1}{8}$ E., leads the same distance westward. The dry portion of Karang Brom Brom bearing E. by N. leads southward of Amelia bank, which should not be approached under a depth of 10 fathoms.

Muntok bank extends from Amelia bank in a direction nearly parallel to the shore for a distance of $10\frac{1}{2}$ miles, and to within a third of a mile of Karang Haji, off tanjong Kalian. It is about 2 miles in breadth, composed of hard sand, and has several patches of from 2 to 3 fathoms water, and 4 or 5 fathoms between, for which see the chart.

An isolated patch, with $2\frac{1}{2}$-fathoms water over it, near the west end of the bank, lies with the lighthouse on tanjong Kalian bearing N. $\frac{3}{4}$ E., distant $1\frac{1}{3}$ miles, from abreast which, depths of 5 fathoms may be obtained towards Karang Haji until very close to it, when the water will suddenly deepen from 11 to 20 fathoms. Menumbing hill in line with the lighthouse on tanjong Kalian, N.E. $\frac{5}{8}$ N., leads westward of the $2\frac{1}{2}$-fathoms patch, between it and Karang Haji.

Working through the strait, and standing towards Muntok bank, vessels should not bring the lighthouse on tanjong Kalian to bear westward of N.N.W. $\frac{1}{2}$ W. when northward of Amelia bank.

Karang Haji, a reef of clay and sand with several black rocks spread over it, lies close to the north-west end of Muntok bank; the rocks are all covered at high water, but many are visible at half ebb. The reef is $1\frac{1}{4}$ miles in length in an east and west direction, and half a mile in breadth, and from its western and outer extreme tanjong Ular is in line with tanjong Bersiap, bearing about N. by E., the latter distant about 4 miles. Close-to on the north, west, and south sides are irregular depths of from 16 to 20 fathoms.

Clearing marks.—Tanjong Ular lighthouse kept well open westward of tanjong Bersiap, bearing N. by E. $\frac{1}{2}$ E., leads westward of this reef; the highest part of Menumbing hill in line with tanjong Kalian lighthouse, N.E. $\frac{5}{8}$ N., leads eastward of it; and tanjong Puni bearing E. $\frac{1}{2}$ S., leads to the southward. A rock, with 2 fathoms water over it, lies about 2 cables northward of Karang Haji.

Buoy.—A nun buoy, painted white and surmounted by a staff and ball, is moored in $4\frac{1}{2}$ fathoms water on the north-west edge of Karang Haji.

TANJONG KALIAN, low and sandy, with some trees behind it, is the south-west extreme of the west end of Banka. About three quarters of a mile north-westward is tanjong Brani, with trees about 127 feet high.

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LIGHT.—The lighthouse upon tanjong Kalian is a stone tower 186 feet in height, with the lower part painted white and upper part red; it exhibits, at an elevation of 170 feet above high water, a *white flashing* light, with a period of system of *fifteen seconds*, the duration of the *flash* being *three seconds* and eclipse *twelve seconds*; it should be visible, in clear weather, from a distance of 20 miles, from the bearing S. 21° E., through east, north, and west, to the land. A dwelling, painted white, is near the lighthouse. Chart, 3,471 [2,549]. Lat. 2° 5′ S. Long. 105° 7½′ E. Var. 0° 40′ E.

Binnen bank is a spit of hard sand, with from 1¼ to 2½ fathoms water over it and from 6 to 7 fathoms about 2 cables from its southern edge, extending nearly 2 miles eastward from tanjong Kalian; half a mile eastward of this spit is a 3¾-fathoms patch. Plan, 2,597 [2,551].

Kalian ledge is a small reef, with one fathom water over it, lying a little more than one mile north-westward of tanjong Kalian. Chart, 3,471 [2,549].

Buoy.—A can buoy, painted black and surmounted by a truncated cone, is moored in 4¾ fathoms water on the south side of Kalian ledge, and marks the north-east side of Kalian pass.

Kalian pass, between tanjong Kalian and ledge and Karang Haji, is three-quarters of a mile wide, with depths of from 13 to 32 fathoms. This channel is generally used by vessels coming from the northward and proceeding to Muntok bay, and with a fair wind is preferable for sailing vessels to the passage southward of Karang Haji; but the great depth, bad anchorage, and strong tidal streams render it unadvisable to attempt to work through.

Kalian lighthouse, bearing E. by S., leads through between Kalian ledge and Karang Haji; the sandy point upon which the lighthouse stands may be passed tolerably close-to.

MUNTOK.—At 2 miles eastward of tanjong Kalian, on the banks of a small river, is the town of Muntok, the capital of Banka island, having a fort upon a hill and some stone houses close to the shore, the red roofs of which are visible at a distance. The Resident and other Dutch officers have houses on the hill near the fort, most of the native houses being nearer the sea. There are barracks, a hospital and large school for Europeans. Plan, 2,597 [2,551]. Lat. 2° 3¾′ S. Long. 105° 10′ E.

The population of Muntok consisted in 1900 of about 4,420, of which 119 were Europeans, mostly Dutch.

In the same year Banka island had a population of 106,305, of which 269 were Europeans and 39,849 Chinese.

Trade.—Shipping.—In 1902 the imports amounted in value to 888,000 guilders, and exports to 81,416 guilders. In the same year the port was entered by 87 vessels, of which 78 were steamers.

General chart, 2,149 [2,548].

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Plan, 2,597 [2,551]. Var. 0° 40′ E.

Pier.—A pier about a quarter of a mile in length extends from the western point of the river, with a depth of 5 feet at its extremity at low water. There is a small camber, westward of the pier, where small trading vessels load and discharge.

Lat. 2° 4′ S. Long. 105° 10′ E.

LIGHTS.—From the extremity of the pier a *red fixed* light is exhibited from a wooden support.

On the inner end of the pier, a *white fixed* light is exhibited, at an elevation of 41 feet above high water, from a wooden support on a stone dwelling, the whole 43 feet in height; the light should be visible, in clear weather, from a distance of 8 miles.

Communication.—The Royal Netherlands Packet Company's steamers running between Batavia and Palembang call here every fortnight, and the line between Batavia and Belawan-Deli every 17 days. Muntok is in telegraphic communication with Sumatra ports and Batavia; thence with all parts. (*See* Chapter I., page 21.)

Coal and supplies.—Coal may be obtained here from the Dutch Government by application to the harbour master, but vessels can only bring it off in own boats. Ships' boats can coal from the pier at any time. Provisions are dear, with the exception of fowls. Medical assistance may be had by application to the Governor.

Anchorage.—The best anchorage for vessels in Muntok road is in depths of from 8 to 10 fathoms, over soft ground, about $1\frac{3}{4}$ miles from the shore, with Menumbing hill bearing about N. by E., and tanjong Kalian from W.N.W. to W. by N. Dutch vessels-of-war stationed in Banka strait, and small vessels trading to Muntok anchor in $4\frac{1}{2}$ or 5 fathoms water, at any convenient distance and direction from the pierhead. The depths in the entrance to the river are from half a foot to one foot.

Signals.—When the entrance to Muntok river is dangerous, a blue flag is hoisted at the harbour master's office at the inner end of the pier.

Charts, 3,471 [2,549]; 2,597 [2,551].

Directions.—The usual route to Muntok road is across Muntok bank. A vessel coming from the northward and bound for the road may proceed either through Kalian pass, or she may pass outside Karang Haji and then follow the usual track across Muntok bank. A good mark for crossing the bank is Menumbing hill in line with the flagstaff on the fort bearing N. by E. $\frac{1}{2}$ E., which leads in depths of from 5 to 6 fathoms; another good mark is Menumbing hill in line with tanjong Kalian light-house N.E. $\frac{5}{8}$ N., which leads between the $2\frac{1}{2}$-fathoms patch on the western end of the bank and Karang Haji.

When over the bank, the water will deepen to 18 or 22 fathoms, over soft muddy bottom, and shoal again quickly towards the shore.

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Working in from the southward over Muntok bank, keep Menumbing hill bearing between N. ½ E. and N.N.E. Chart, 3,471 [2,549]. Var. 0° 40′ E.

Working into Muntok road from the eastward a vessel should keep between the shore and Muntok bank, being careful not to bring tanjong Padah to bear to the eastward of E.N.E., until Menumbing hill bears N.W. by N.

A hard, sandy bottom and shallow water will be found when near the edge of Muntok bank; while, to avoid the shore bank, Menumbing hill must not be brought to bear westward of N.W. by N., and taking care not to shoal to less than 5 fathoms water.

Tides.—It is high water, full and change, at tanjong Kalian in June at 10 p.m., and in December at 10 a.m.; springs rise 12 feet.

Tanjong Bersiap, 168 feet above high water, lies 3½ miles north-north-westward of tanjong Kalian. The coast between is fronted by a bank extending nearly a mile off, with depths of from 7 to 10 fathoms close-to. Within the edge of this bank, and lying some distance off tanjong Bersiap, is a cluster of rocks, some of which are above water.

Bersiap hill, 336 feet above high water, is small, isolated, and stands about 1½ miles within the point.

TANJONG ULAR, 156 feet above high water, lies about 4 miles northward from tanjong Bersiap, the coast between forming a bay about one mile deep nearly in the centre of which is a yellowish cliff. A reef, with rocks above water in places, extends nearly one mile off tanjong Ular.

LIGHT.—On tanjong Ular an iron framework lighthouse, 42 feet in height and painted white, exhibits, at an elevation of 52 feet above high water, a *white flashing* light, with a period of system of *half a minute*, showing a *flash* for *five seconds* followed by an eclipse of *twenty-five seconds*; it should be visible, in clear weather, from a distance of 12 miles, from the bearing of S. 49° W. through south, to the shore. There is a dwelling, painted white, near the lighthouse. Lat. 1° 57¾′ S. Long. 105° 7¾′ E.

Ular reefs consist of rocky and uneven ground, with rocks above water in places, extending from 1½ to 2½ miles off shore between tanjong Bersiap and tanjong Ular.

Transit rock lies at the western extremity of this rocky ground, at 2½ miles off shore, and 8 cables westward from O'Flaherty reef, which is uncovered, except at high water, spring tides, with depths of 6 to 10 fathoms between them. The least depth on Transit rock is 2 fathoms, with tanjong Ular lighthouse bearing N.E. by E. ½ E., and Menumbing hill in line with the yellow cliff, E. by S. ⅞ S. There are depths of from 5 to

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Chart, 3,471 [2,549]. Var. 0° 40′ E.

14 fathoms over irregular bottom around the rock, and 20 fathoms at one cable westward of it.

A rock, awash at low water, spring tides, lies E. ½ N. 2 cables from Transit rock, and a patch of 5½ fathoms (perhaps less), over rocky bottom, at half a mile northward of Transit rock, with 20 fathoms close-to; the latter is indicated by strong ripples.

Clearing marks.—Tanjong Brani, bearing S.S.E. ½ E., leads westward of Transit rock; and tanjong Biat, bearing E.N.E., leads northward.

A rocky patch of 6½ fathoms lies nearly midway between Transit rock and Frederik Hendrik rocks, with Kalian lighthouse bearing S.E. ⅛ S. distant 8¼ miles.

Tides.—It is high water, full and change, at tanjong Bersiap and tanjong Ular at 6h. 30m.; springs rise 12 feet.

Chart, 2,597 [2,551]. Lat. 2° 55½′ S. Long. 105° 10½′ E.

TANJONG BIAT, 3 miles north-eastward from tanjong Ular, has rocks above and below water, extending nearly one mile off.

Sebidung Uma, a round, rocky patch about half a mile in diameter, with 3 feet least water over it, lies 2 miles off the coast, midway between tanjong Ular and tanjong Biat, with depths of from 10 to 12 fathoms between it and the shore bank; patches with a depth of 5 fathoms lie north-north-eastward and south-south-westward of Sebidung Uma.

As this bank is "steep-to," great caution is necessary when navigating in this locality.

Clearing marks.—Tanjong Ular lighthouse, bearing S. by E. ½ E., leads half a mile westward of Sebidung Uma; and Bukit Batu, a hill 708 feet above high water, about 11 miles eastward of tanjong Biat, bearing E. ½ S., leads one mile northward of it.

Chart, 3,471 [2,549]. Lat. 1° 58′ S. Long. 104° 57½′ E.

FREDERIK HENDRIK ROCKS lie at the northern entrance of Banka strait, nearly midway between Batakarang point on the Sumatra coast and Transit rock off the Banka coast. They consist of two rocky patches, lying in a north and south direction from each other, having 9 feet on the northern patch and 3 feet on the southern. The two patches occupy a space about three-quarters of a mile in length and half a mile in breadth.

From the 3-feet patch, Menumbing hill bears E. ⅞ S. distant 14 miles; and the lighthouse on tanjong Kalian S.E. by E. ⅛ E. 12½ miles.

Close around the rocks the depths are 16 to 20 fathoms, except to the southward, where a bank with depths of 8 to 10 fathoms stretches about one mile southward of the south patch.

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Buoy.—A buoy, painted red and surmounted with a staff and ball, is moored in 5 fathoms water on the north edge of the 3-feet patch. Chart, 3,471 [2,549]. Var. 0° 40′ E.

Clearing marks.—Menumbing hill bearing E. ¾ S., leads about half a mile southward of the 3-feet patch; and Menumbing hill in line with the yellowish cliff between Bersiap and Ular points, E. by S. ⅞ S., leads 2 miles northward of the northern patch.

STANTON CHANNEL.—General remarks.—Buoyage.—Stanton channel, the eastern and best entrance to Banka strait from the southward, is 19 miles in length, and 2⅔ miles in breadth between the 5-fathoms contour lines at its narrowest part, with depths in mid-channel increasing gradually from 7 fathoms at its south-eastern entrance to 20 fathoms near the other extreme. Chart, 2,808 [2,552].

The approaches from the southward are marked by the well-defined mount St. Paul, the conical hills of Gadong and Toboali Lama, the light-house on the Dapur islands, and in fine clear weather by the more distant range of Pading; these cannot fail to point out the entrance, and the water being deep within half a mile of Dapur islands, will give strangers confidence in steering for the land. Prominent points and hills will also be seen along the Banka coast, bearings of which will enable a vessel at any time to ascertain her position.

The channel is bounded by narrow sandbanks, with a mixture of mud and sand between. The two marking the western boundary of the channel are named Smits and Melvill banks, after the late Lieutenants Smits and Melvill of the Dutch Royal Navy, whose valuable contributions to hydrography in the Java sea are so well known to seamen.

CAUTION.—Too much dependence must not be placed on the buoys maintaining their assigned positions.

Smits bank consists of four small banks, nearly connected, and forming within the depth of 5 fathoms a narrow ridge 19 miles in length, connecting with another ridge which runs parallel to it on the western side.

The southern of the small banks, about 8 cables in extent, has 2¾ fathoms water over it, and lies 5⅓ miles north-westward of the south-east 5-fathoms limit of the ridge. Lat. 3° 6′ S. Long. 106° 17′ E.

The second bank, about 3 miles north-west of the preceding, is about one mile in extent, with a depth of 3 fathoms over it.

The third bank, lying 2 miles north-westward of the foregoing, is about 2¼ miles in extent, and has a least depth of 2 feet over it; this is the shoalest part of the bank, and from it pulo Dawon lighthouse bears N. ⅞ E. distant 6½ miles.

General chart, 2,149 [2,548].

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Chart, 2,803 [2,552]. Var. 0° 40′ E.

The fourth, or northern, bank, which is nearly 2 miles south-east of the north-west 5-fathoms limit of the ridge, is about 2 miles in length, and has 10 feet least water over it.

Buoy.—A nun buoy, painted white, and surmounted by a staff and ball, is moored on the north-east side of the northern bank.

Clearing marks.—Panjang hill, bearing N.E. ¼ N., leads north-eastward of Smits bank and between it and Nemesis bank, in 6 fathoms at low water. Gadong peak in line with Toboali point bearing N.E. ¼ E., or Lucipara island S.W. ⅛ S., leads south-eastward in a depth of 4 fathoms; the north-eastern side should not be approached under a depth of 10 fathoms.

Melvill bank, 5 miles in length within the 5-fathoms contour line, and about half a mile in breadth, lies two-thirds of a mile eastward of the south-eastern part of Smits bank, with a depth of 7 and 8 fathoms between, and has a least depth of 2 fathoms over it, situated 3¼ miles from the south-east limit of 5 fathoms.

Lat. 3° 2′ S. Long. 106° 15½′ E.

Buoy.—A nun buoy, painted white and surmounted by a staff and ball, is moored on the north-east side of the shoalest part of the reef.

Clearing marks.—Labu point, bearing N. by E. ½ E., leads south-eastward of the bank, in 7 fathoms water; and Mamelon hummock just open of pulo Besar lighthouse, N.W., leads eastward of Melvill bank in about mid-channel.

Between the above banks and Lucipara island, there are many other banks all trending in the same direction, with narrow deep water channels between; but as these channels are narrow, and no marks can be given to clear the banks, they are not available for vessels.

Eastern bank, marking the eastern side of Stanton channel, is 16 miles in length, within the 5-fathoms contour line, and about one mile in breadth abreast Labu point. It is formed by three banks nearly joined together, with from 2¾ to 3 fathoms on the south-eastern, 4 feet on the middle, and 1½ to 3 fathoms on the north-western bank.

A bank of sand lies one mile westward of the south-eastern extreme of Eastern bank, but not less depth than 4½ fathoms were found on it at low water.

LIGHT BUOY.—A light buoy, painted black and exhibiting a *white occulting* light, with a period of system of *twenty seconds*, showing light for *ten seconds* followed by an eclipse of *ten seconds*, is moored with Toboali fort bearing E. ½ N., distant 8 $\frac{4}{10}$ miles.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, is moored on the western side of the northern bank with pulo

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Dawon bearing N. by W. $\frac{1}{4}$ W., distant $3\frac{4}{10}$ miles. *See* **Caution**, page 483. Chart, 2,80; [2,552]. Var. 0° 40′ E.

Clearing marks.—Gadong peak, in line with Toboali fort, bearing N.E. $\frac{1}{2}$ N., leads southward of Eastern bank in $4\frac{1}{2}$ fathoms water; and Mamelon hummock in line with pulo Besar lighthouse, bearing N.W. $\frac{1}{8}$ W., leads westward of the bank.

Nemesis bank, lying in the fairway between Pudi point and False First point, is a ridge of sand extending 9 miles in a north-west and south-east direction, with irregular depths of 3 to 10 fathoms. A patch of 2 fathoms water, the least known depth, lies with Lalari point bearing N.W. by N., distant $4\frac{1}{2}$ miles. Chart, 3,471 [2,519]. Lat. 2° 53′ S. Long. 105° 59′ E.

LIGHT BUOY.—A spherical buoy, painted red and black in horizontal stripes and exhibiting a *white occulting* light, with a period of system of *twenty seconds*, showing light for *ten seconds* followed by an eclipse of *ten seconds'* duration, is moored on the north-west side of the 2-fathoms patch with Pudi point bearing N.E. $\frac{1}{4}$ N., distant about 4 miles. *See* **Caution,** page 483.

Clearing marks.—Tanjong Mentigi kept open of Lalari point, bearing N. by W. $\frac{3}{4}$ W., leads westward of Nemesis bank, in 14 fathoms water; Mamelon hummock, N. by E. $\frac{1}{4}$ E., leads eastward; and Lalari point bearing N.W. $\frac{1}{4}$ N. leads north-eastward. A patch of 5 fathoms is situated 2 miles within its south-eastern extreme.

Anchorage may be found in any part of Stanton channel, but vessels bringing up with a kedge anchor must always be prepared to let go the bower anchor, as there will be experienced, particularly during the change of the monsoons, very dangerous squalls, with heavy rain, thunder and lightning, which generally last for about an hour.

Tides.—During the south-east monsoon it is high water, full and change, at Toboali point, on the Banka shore, at 8h. 30m., and, during the north-west monsoon, at 10 a.m.; ordinary springs rise 10 and sometimes 12 feet. The highest tide generally occurs two days after full and change.

It is high water, full and change, at Labu point at 11h. p.m. in the south-east monsoon; ordinary springs rise 10 feet.

Tidal streams.—The flood stream sets north-westward, and runs for about 12 hours, and the ebb the same period in the opposite direction, but they are both sometimes influenced by the strength of the monsoon. The rate at springs is $2\frac{1}{2}$ knots. When it is blowing strong from the south-east the flood stream often runs from 14 to 18 hours.

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Chart, 2,808 [2,552]. Var. 0° 40′ E.

Northward of Lalari point, in the south-east monsoon, the flood sets north-north-westward, and the ebb south-south-eastward, along the Banka shore.

The time of high water at Labu point being 2½ hours later than at Toboali point in the southern part of Stanton channel, for a few days after full and change the tides will be found (as there is generally 12 hours' flow and ebb) to run in one direction all night, and the opposite direction during the day, with a velocity of 2½ to 3 knots. The stream sets directly in mid-channel, the flood north-westward, and the ebb south-eastward, so that sailing vessels may take advantage of it in light airs to drop through.

Charts, 2,597 [2,551], 2,808 [2,552].

Directions.—Vessels from the southward intending to proceed into Banka strait by Stanton channel cannot fail, in approaching the coast of Banka, to recognise mount St. Paul by its flattish top having several nipples of nearly the same elevation, and Gadong and Toboali Lama peaks by their conical appearance. Should the weather be clear, the distant high range of Pading will be visible. The highest peak of this range is quoin-shaped, attaining from its western shoulder an elevation of 1,677 feet, with several lower hills of a rounder and more conical appearance adjoining, the two westernmost being about 1,200 and 1,400 feet above high water.

Lat. 2° 37′ S. Long. 106° 29′ E.

Sailing vessels, after recognising mount St. Paul and Toboali Lama peak, should approach the latter on a North bearing, when Dapur lighthouse should shortly be visible. When about 3 miles from the lighthouse, steer about N.W. by W. allowing for the tidal stream, which course will lead in about mid-channel to abreast Banka point, between the buoys marking Eastern bank and those on Melvill and Smits bank; observing that Mamelon hummock (if it can be distinguished) just open of or in line with pulo Besar lighthouse, or the latter bearing N.W. ⅛ W., leads well eastward of Melvill and Smits banks and of the buoys marking them.

When off Labu point, the high range of Parmasang will be visible, rising from a gradual slope on its western shoulder to a flat top peak, with two lower peaks adjoining. The three hills, Banka, Panjang, and Woody, will also be seen; the two former may be known by their wedge shape, and the latter by its isolated position.

When pulo Dawon lighthouse bears North, distant about 4 miles, steer N.W. by W. ¾ W., to pass about 2 miles southward of Lalari point and northward of Nemesis bank buoy; the lighthouses afford ready means of checking the position of the vessel. From Lalari point to Karang Tambaga the shore bank may be avoided by not shoaling under a depth of 10 fathoms. From Lalari point, *see* page 489.

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At night.—Stanton channel being partly lighted is available for vessels of light or moderate draught at night, but it is preferable for those unacquainted with the channel to choose daylight. Chart, 2,803 [2,552]. Var. 0° 40′ E.

Dapur island light may be steered for bearing North until 3 miles distant, when the depths should be from 12 to 14 fathoms, and the course then altered to N.W. by W. When pulo Besar light is sighted it may be steered for bearing N.W. $\frac{1}{8}$ W., and the light buoy on the south side of Eastern bank will be a guide to clear Melvill bank, but should it not be seen, Dapur island light must not be brought to bear southward of E.S.E. to clear Eastern bank.

Working through Stanton channel from the eastward, vessels may stand towards the south extreme of Dapur islands to a distance of half a mile, as these islands have deep water at 4 cables from them. Between this and Toboali the shore mudflat may be approached until Dapur island lighthouse bears S.E. by E., and Lucipara island may be approached to a distance of 4 miles; but when Gadong peak comes in line with Toboali fort N.E. $\frac{1}{2}$ N., pulo Dapur lighthouse must not be brought to the southward of E.S.E. to clear Eastern bank.

Parmasang berg kept eastward of pulo Besar lighthouse or Banka hill bearing N.W. $\frac{1}{2}$ N. will lead northward of Melvill bank; and when Labu point bears eastward of N.E. by N., by not shoaling under 10 fathoms, all the banks on both sides will be cleared.

The shoal patch on Nemesis bank (marked by a light buoy) should not be approached under a depth of 10 fathoms until tanjong Mentigi comes open of Lalari point, bearing N. 20° W., and in rounding the latter point the water should not be shoaled to a less depth than 10 fathoms, as the bank is here "steep-to." Karang Tambaga may also be avoided by following the same precaution, and from thence it is recommended to work up from Second point along the Sumatra coast.

These directions reversed will apply when working in the opposite direction.

LUCIPARA CHANNEL, from $1\frac{1}{2}$ to 2 miles wide, is the western entrance to Banka strait from the southward, and is marked by two buoys on its eastern side; the western side of the channel is bounded by the mudflat which projects from the coast of Sumatra for 2 miles or more; this flat may be approached by the lead until within about one mile of Green point, northward of which it is "steep-to." This channel is not available for vessels of heavy draft.

Round shoal.—The southern sandbank in this channel is nearly 2 miles in length, in a north-west and south-east direction, and one mile Lat. 3° 7¼′ S. Long. 106° 7¼′ E.

General chart, 2,140 [2,548].

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Chart, 2,808 [2,552]. Var. 0° 40′ E.

in breadth. The least water, 1½ fathoms, is near the centre, with the summit of Lucipara island bearing S.E. ¼ E., distant 8¼ miles.

Buoy.—A buoy, painted black and surmounted by a truncated cone, marks the west extreme of this shoal.

Hindostan bank lies close northward of Round shoal, and is about 3½ miles in length. The depths on the southern and middle parts are from one fathom to 3 fathoms, but about three-quarters of a mile from its northern extreme is a patch of hard sand with only 3 feet water over it. From this patch Green point bears W. by N. ¼ N., distant 3¼ miles.

Merapie shoal, the northernmost of the dangers on the eastern side of Lucipara channel, is composed, like the others, of hard sand, and is three-quarters of a mile in extent in a north and south direction. The least water, 2¼ fathoms, lies with First point bearing W. by N. ½ N., distant 3 miles.

Lat. 3° 1′ S. Long. 106° 6′ E.

Buoy.—A buoy, painted black and surmounted by a truncated cone, moored in about 5 fathoms water, marks the west extreme of this shoal.

Tidal streams.—The tidal streams set strongly over the banks.

Directions.—To steam vessels, Lucipara channel presents no difficulties, but it is not recommended for vessels of heavy draught, there being only about 4 fathoms on the leading mark at low water. Approaching Lucipara channel from the southward, and being northward of Arend bank, Lucipara island may be steered for, between the bearings of N. by E. and N.W., in depths of from 5½ to 9 fathoms; with westerly winds a sailing vessel should keep on the western side of the channel in low water depths of from 4¾ to 5½ fathoms.

In Lucipara channel the bottom is generally hard sand on the banks towards the eastern side, and soft mud on the western or Sumatra side; yet close to the north-western edge of Hindostan bank, the bottom is also soft, with depths of 5½ and 6 fathoms; it is therefore advisable not to keep in too soft bottom, but in the middle of the channel.

In clear weather, when the Parmasang range is visible, the highest peak on the western extreme of the range in line with First point, N. 16° W. will lead into Lucipara channel, about half a mile clear of the 3-fathoms edge of the mudbank projecting from Lucipara point. From abreast the point the course is N. by W. (allowing for the tidal stream) with Mamelon hummock ahead, passing westward of the buoys marking Round and Merapie shoals.

When False First point opens, bearing about W.N.W., a vessel may edge away to the westward to round First point, taking care not

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to approach it nearer than one mile, as the bank projecting from the point is "steep-to," especially on its north-east side. After rounding First point, a N.W. by W. course will lead midway between False First point and Nemesis bank buoy, and when Lalari point bears N. by W. $\frac{3}{4}$ W. course may be altered to N.W. Chart, 2,868 [2,552]. Var. 0° 40′ E.

Working through this channel a sailing vessel may stand towards the Sumatra bank safely by attending carefully to the lead, but must not stand into a less depth than 6½ fathoms when near the elbow projecting off Green point, which is "steep to." Lucipara island must not be approached nearer than 2 miles, when bearing northward of N.E.

Careful attention to the lead will also give sufficient warning when standing towards the banks on the eastern side. The tidal streams set across the banks with considerable strength. (*See* page 456.)

Directions.—From Lalari point through Banka strait.—Having passed through either Stanton or Lucipara channels, and brought Lalari point to bear about East, distant 3 miles, a N.W. by N. course, allowing for the tidal stream, for about 10 miles, will lead midway between the rocky bank of 7 to 8 fathoms water, lying north-westward of Karang Tambaga and the mudbank projecting from Second point. Thence steer to pass about midway between Nangka lighthouse and Third point, observing that Second point bearing southward of S.S.E. leads eastward of the bank fronting Second bight. Chart, 3,471 [2,549]. Lat. 2° 48¾′ S. Long. 105° 57¼′ E.

When about 2 miles northward of Third point (Lightbuoy, *see* page 460), steer to the westward, passing midway between Karang Brom Brom and Fourth point; and when Menumbing hill bears North, distant about 12 miles, keep more to the north-westward, paying particular attention to the tidal streams, which frequently set strong into or out of the rivers between Fourth and Batakarang points.

With tanjong Kalian lighthouse in line with Menumbing hill bearing N.E. $\frac{5}{8}$ N., the former distant about 5 miles, course may be shaped to pass eastward of Frederik Henkrik rocks. The lighthouses on tanjong Kalian and tanjong Ular afford ready means of fixing the position of the vessel from time to time.

If passing westward of Frederik Hendrik rocks, between them and Sumatra, vessels should keep in from 5 to 7 fathoms water on the edge of the bank off Batakarang point, and not more to the eastward than in 9 or 10 fathoms, while Menumbing hill is between the bearings of East and E. by S.

Thence to the northward steer as requisite.

General chart, 2,149 [2,548].

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Chart, 3,471 [2,549]. Var. 0° 40′ E.

For outer route, *see* Directions, page 599; Rhio strait, page 623; and Inner route (Berhala), page 663.

Working through Banka strait from the southward.—Directions have already been given for working through Stanton and Lucipara channels to Lalari point at pages 487, 489. In working between Lalari point and Nangka islands the lead is a good guide, as the depths decrease regularly, except near Lalari point and Karang Tambaga, where they decrease rather suddenly from a depth of 10 fathoms; if, however, Lalari point be not brought to bear southward of S.E. ¼ S. until Brani peak bears E.N.E., a vessel will keep clear of all danger near Karang Tambaga.

Having arrived within 3 miles of Great Nangka, the spit extending from the south end of that island should not be approached under a depth of 7 fathoms; and to avoid the rocky ledges extending from Middle and West Nangka, West reef rock, 6 feet above water, should not be brought to the westward of North after the peak of Great Nangka bears N.E., until the vessel is northward of Nangka islands.

Lat. 2° 23′ S. Long. 105° 45′ E.

From Nangka islands to tanjong Padah the shore may be safely approached by the lead, as the depths gradually decrease. When tanjong Padah bears N.E. ⅔ N. (which clears the eastern side of Karang Brom Brom), vessels should cross over towards Fourth point on the Sumatra coast.

The bank fronting the Sumatra coast may be conveniently approached, when abreast the bights, by common attention to the lead; but off the points, and for a few miles on either side of them, great attention must be paid to the soundings, and the bank approached with caution, and never under a depth of 10 fathoms, as the water shoals suddenly from that depth. The most dangerous part of the bank is between Fourth point and 7 miles to the westward of it.

Westward of that part, the bank becomes shelving, and may be approached to a depth of 5 fathoms. Working westward of Frederik Hendrik rocks, the shore bank should be approached to a depth of 5 fathoms off Batakarang point; but standing towards the rocks, a vessel should tack when the water deepens to 9 fathoms, which depth will be about one mile westward of the rocks, there being from 12 to 16 fathoms close to them. Working through eastward of Frederik Hendrik rocks (should the buoy be adrift), it must be remembered that Menumbing hill bearing E. ¾ S. leads one-third of a mile southward of the rocks, and bearing E. by S. ¼ S. leads the same distance northward of them.

Sailing vessels working in either direction through the strait, or proceeding through with a fair wind and contrary tidal stream, are

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recommended to keep on the Banka side, when between Lalari point and tanjong Padah. The advantages are as follows:— Chart, 3,471 [2,549]. Var. 0° 40′ E.

A vessel may carry a fair stream all the way through by starting from either extremity at low water, as the tidal waves from the China and Java seas meet near Nangka islands; prominent hills and points, with a gradual decrease in the depths, give confidence to mariners when steering for the land; a strong land wind will be generally experienced during the night when the regular monsoon is blowing in the middle of the strait and near the Sumatra coast; and, in the strength of the monsoon, regular tidal streams will be met with on the Banka side, while strong currents will invariably be found setting to leeward along the Sumatra side.

Banka strait from the northward.—A vessel having passed the Tuju or Seven islands, and steering to the southward for Banka strait, will find no difficulty in clear weather in determining a position, which can be readily done by cross bearings of Gunong Penyabung (Saddle hill) and Menumbing hill; under such circumstances the strait should be entered eastward of Frederik Hendrik rocks. In thick weather it often happens that no land can be seen until the vessel has arrived very near to the entrance of the strait, and at such times it is important to get hold of the bank extending from the Sumatra coast, and then proceed along its edge in low water depths of from 8 to 6 fathoms, carefully attending to the lead. Sometimes Menumbing hill will be seen, but no other land, and in such case it will be prudent to proceed as before, keeping along the edge of the bank. Lat. 1° 13′ S. Long. 105° 17′ E.

Working through Banka strait from the northward.—The passage westward of Frederik Hendrik rocks is much to be preferred when the land is obscured and reliable bearings cannot be obtained; at other times the eastern channel is preferable. By reversing the directions, previously given for working through from the southward, no difficulty will be experienced.

NORTH-WEST AND NORTH COASTS OF BANKA.

BULU OR JIBUSE BAY.—The north-west coast of Banka is about 40 miles in extent, from tanjong Ular to tanjong Melalu; Bulu or Jibuse bay, lying between tanjong Biat and tanjong Genting, occupying 16 miles. Chart, 2,597 [2,551].

In the greater portion of this bay a depth of 3 fathoms, over foul ground, will be found at 2 miles from the shore. Off tanjong Genting, a long and low point, the foul ground extends but half a mile, close to which there is a depth of 8 fathoms. Bulu and Kampa rivers enter the bay at its eastern end, and Jibuse, the chief town of the district, is Lat. 1° 42½′ S. Long. 105° 20′ E.

General chart, 2,149 [2,548].

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Chart, 2,597 [2,551]. Var. 0° 45′ E.

situated on a branch of the latter river and reached by flat-bottomed boats. The bay is much visited by coasters, and occasionally by larger vessels for the purpose of loading tin.

Lat. 1° 46′ S. Long. 105° 22½′ E.

Kamudy rock, awash at low water, lies within the 3-fathoms contour line, 2¼ miles west-south-westward of Sungi Kampa entrance, with tanjong Genting bearing N.W. ⅝ N., distant 5 miles.

Anchorage.—Bulu bay affords anchorage in 5 fathoms water, over soft muddy bottom, with tanjong Genting bearing N. by E. ½ E., distant 1½ miles, and Sungi Kampa E. by S. ½ S. Small vessels may go farther in according to draught.

Aspect.—North-eastward of tanjong Genting are some conspicuous hills, which at a considerable distance appear like islands; from the southward they are respectively: Gunong Pare, 858 feet; Gunong Penyabung (a remarkable saddle-shaped hill close by the coast), 794 feet; Gunong Besukan, 657 feet above high water; and Gunong Ganteng; which has three conspicuous hills and is situated 4 miles eastward of Gunong Besukan.

Lat. 1° 40′ S. Long. 105° 22¾′ E.

The coast between tanjong Genting and Gunong Penyabung forms a small bay, encumbered with rocks. It thence trends north-eastward for 4 miles to pulo Pamuja, an islet close to the coast, thence in a direction a little more eastward for 5 miles to tanjong Doyang, off which lies pulo Prout, and several rocks above water; thence eastward about 9 miles to tanjong Melalu. The whole shore between Gunong Penyabung and tanjong Melalu is fronted by a reef which extends in places for a distance one mile.

A reef, nearly dry at low water, lies N.E. ½ N., distant 2 miles from pulo Pamuja.

Off-lying rocks.—Malan Hyu, Malan Doyang, and Malan Guntur e three rocks lying off the coast between tanjong Doyang and tanjong Melalu. Malan Hyu, about 30 feet in length, and covered with guano, es North, distant 3 miles from tanjong Doyang.

Malan Doyang is the same size as Malan Hyu, and not much above water; it lies W.N.W. 3½ miles from Seangus point, is about 3¾ miles off shore, and the same distance east-north-eastward of Malan Hyu.

Dina, a small coral reef with 3 feet water over it, lies S. by W. ¼ W., istant about one mile from Malan Doyang.

Two rocks awash lie between Dina and the shore, distant 1¾ and 2½ miles, W. by S. ¼ S., from Seangus point.

Malan Guntur, with two heads above water, lies nearly midway between Malan Doyang and tanjong Melalu, about a mile northward of

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Seangus point; a rock awash lies about half a mile, W.N.W., of the northern rock. Chart, 2,597 [2,551i]. Var. 0° 45′ E.

Close northward of Malan Hyu and Malan Doyang the depths are irregular, 12 to 24 fathoms; between them and the shore the depths are from 7 to 11 fathoms, over rocky bottom. By keeping 4 miles off shore these dangers are avoided.

KLABAT BAY.—Tanjong Melalu or Melala is the western point of entrance of Klabat bay, and upon it is a hill of moderate height, known as mount Melalu. A reef extends about one mile north-eastward of the point. Lat. 1° 31½′ S. Long. 105° 37′ E.

Penyusu point, on the eastern side of Klabat bay, is a long low projection, with Penyusu islet lying about three-quarters of a mile westward of it; a reef extends about a mile northward, and a shoal, with one fathom water over it, lies one mile westward, of the islet, and on its north-west side there are some rocky patches, the outer, with 4½ fathoms water over it, being distant about 1½ miles from the islet.

Klabat bay extends about 16 miles in a southerly direction from tanjong Melalu, and is 5½ miles in width between the entrance points; it is encumbered with rocks and shoals, leaving only a narrow passage of 4 or 5 fathoms water, by which small vessels proceed as far as the mouth of Menjangan river.

Blingu, the head town of this mining district, is 2 miles inland from the eastern side of the bay; it has a square fort and barracks within it.

Trasie Laut rock has one fathom water over it, and is surrounded by depths of from 7 to 10 fathoms; it lies about 3 miles, N.W. ⅛ N., from tanjong Penyusu.

Buoys.—The entrance to the channel leading up the bay is marked by two buoys:—

A can buoy, painted black, with the south-west point of Penyusu islet bearing E. ¼ N., distant one mile, on the port hand entering.

A nun buoy, painted white, with the south-west point of Penyusu islet bearing N.E. ⅞ N., distant 5¾ cables on the starboard hand entering.

Gunong Maras (Crown Peak).—At about 8 miles south-eastward of the head of Klabat bay is Gunong Maras or Crown peak, 2,300 feet above high water, the highest of the Banka mountains. This mountain is easily recognised by its three peaks, which may often be seen when passing through Banka strait, presenting somewhat the appearance of a crown. Lat. 1° 52′ S. Long. 105° 52′ E.

Anchorage.—The usual anchorage is off the entrance of the bay, south-east of Trasie Laut, in 9½ or 10 fathoms water, over soft muddy

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Chart, 2,597 [2,551]. Var. 0° 45′ E.

bottom, with Penyusu islet in line with Gunong Maras, bearing about S.S.E. $\frac{1}{2}$ E., and Melalu point W. by S. $\frac{3}{8}$ S. Tin is shipped from here.

Directions.—The channel to the head of the bay lies on its eastern side, and at Mantong point, 7 miles southward of Penyusu point, there are Government storehouses. This channel is entered by bringing the north side of Penyusu island to bear E. by N. $\frac{1}{2}$ N., and steering for it between the black and white buoys, with not less than $3\frac{3}{4}$ fathoms water; having passed the inner buoy, course should be steered to pass westward of Morantong and Mantong points.

COAST.—The coast, from tanjong Penyusu, trends eastward for 11 miles to a point abreast pulo Mengkudu; and thence 2 miles, in the same direction, to tanjong Grasak, the north point of Banka.

Many rocks lie close to this part of the coast, and shallow water extends in places nearly one mile off. From tanjong Grasak the coast trends south-eastward, forming the eastern coast of Banka.

Reefs.—A patch, with $3\frac{1}{4}$ fathoms water over it, lies $2\frac{3}{4}$ miles off shore with pulo Mengkudu bearing E. $\frac{3}{8}$ S., distant $4\frac{1}{2}$ miles.

A shallow spit extends from Sungi Pasarin to within half a mile of this patch.

Lat. 1° 31′ S. Long. 105° 59½′ E.

A reef, having about 6 feet water over it, lies 2 miles northward of Paku point, with tanjong Grasak bearing W. $\frac{7}{8}$ N., distant $3\frac{1}{2}$ miles. For the east and north-east coasts of Banka island, *see* pages 500, 528.

General chart, 2,149 [2,548].

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CHAPTER VIII.

GASPAR STRAIT AND ITS APPROACHES.

GASPAR STRAIT.—General remarks.—Gaspar strait, between the large islands of Banka and Belitung or Billiton, derives its name, as we are informed by Horsburgh, from the Spanish captain who passed through it in 1724, though Captain Hurle had previously done so when returning from China in the *Macclesfield* galley, in March 1702. Chart, 2,137 [2,550]. Var. 1° 0′ E.

Many islands divide the strait into three principal branches, having the names of Macclesfield, Clement and Stolze channels. The first, through which the *Macclesfield* passed, is formed by Lepar and Liat islands.

The second is named after Captain Clements, who, commanding a fleet of English India ships in 1781, and returning from China, chose the passage formed by Liat, Kwil, and Kalangbue islands to the westward, and Klemar and Auer islands to the eastward.

The third, Stolze channel, is bounded by Gresik island on the west side, and Mendanau island, on the east side, and is so named after the Dutch naval officer, J. Stolze, who was deputed to ascertain the positions of the islands on the west coast of Belitung.

Although the navigation of this strait is encumbered with many dangers, yet, as the course by it is more direct, and the distance less than by that of Banka, many seamen are induced to prefer it, especially when returning from China late in the north-east monsoon. The comparative advantages of both straits with reference to sailing vessels bound to Singapore and China have been shown in page 44; and it will only be necessary here to add a few remarks with reference to those returning from China.

Most homeward bound vessels, to whom saving of time is of the first importance, proceed through Gaspar strait; and there can be no doubt that they will continue to do so in preference to the more circuitous, although much safer, route of Banka strait. Until, however, the correct positions of all the shoals and dangers known to exist to the northward of Gaspar strait are determined, a vigilant look-out must be kept when approaching the strait from that direction, as dangers may exist that are not marked on the charts. Nor must vigilance be relaxed when getting near to pulo Liat and when passing through the strait.

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Chart, 2,137 [2,550]. Var. 1° 0′ E.

No opportunity should be lost of determining the vessel's exact position; and the greatest attention should be paid to ascertaining the set of the current and to guard against its effects. A number of large sailing vessels have been lost in Gaspar strait; particularly on Alceste reef, from wrongly estimating their distance from the land; but, in the majority of instances, from causes which might have been guarded against by the exercise of due care and judgment.

Macclesfield channel was formerly the one generally taken, although Stolze channel is equally available. Both are partly lighted. Clement channel, between them, is much narrower than either of the other two, and its navigation somewhat more difficult.

Lat. 2° 32′ S. Long. 107° 38′ E.

Tides.—Near Langkuas island (Eleven islands) the tides are diurnal. Springs occur about 50 hours after the time of the moon's greatest declination, at about noon in the first half of November and becoming two hours earlier each month; neaps happen at the same period after the moon has no declination. Springs rise from 4 to 8 feet, the highest spring tides occurring in the second half of June, and of December.

Lat. 3° 19′ S. Long. 107° 13′ E.

Near Shoalwater island the tides are subject to some diurnal irregularities. Springs and neaps occur about 40 hours respectively after the time of the moon's greatest declination, and after it having no declination. The highest tides are experienced at the same times as at Langkuas island, but the greatest rise only amounts to 6 feet.

Tidal streams.—Near Langkuas island there is a daily stream that, in 24 hours, works round against the sun, and is strongest in a N.N.E. and S.S.W. direction, running for 6 hours after arriving at these directions, but with half the strength to the W.N.W. and E.S.E. The influence of the monsoon stream, on these daily streams is strongly felt.

From December to May this influence is greatest, the S.E. and S.W. going streams being considerably increased, and those to the N.W. and N.E. considerably weakened, mostly in February and in March, when the monsoon stream runs from S.S.E. to S. by E.

From June to November the influence of the monsoon stream is not so great; the daily stream to the west, through north, to east is stronger and that to the west, through south, to east the weaker, mostly in August and September, when the monsoon stream runs from N.W. to N.W. by N.

DANGERS. — Southern approach. — Dangerous shoals extend for about 35 miles to the southward of Gaspar strait, rendering great caution necessary when approaching the strait from that direction.

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Hippogriffe rocks, the south-westernmost of these dangers, lies on the eastern side of Macclesfield strait, S.E. $\frac{1}{8}$ S., distant 36 miles from Dapur island lighthouse and S.W. $\frac{3}{8}$ W., 23 miles from Shoalwater island lighthouse. Chart, 2,137 [2,550]. Var. 1° 0′ E. Lat. 3° 34½′ S. Long. 106° 55½′ E.

They consist of four coral patches forming a circle about half a mile in diameter. The least water on the middle reef is 4 fathoms, on the northern reef $1\frac{3}{4}$ fathoms; and on the two southern, which lie in an east and west direction from each other, 3 feet on the eastern and 2 fathoms on the western. Round the reef there are depths of from 8 to 9 fathoms, over hard sand and shells, and they sometimes show by tidal rips.

Hancock shoal, a small patch, composed of coral, about a quarter of a mile in extent, with 3 fathoms water over it, and 6 to 7 fathoms around, lies $9\frac{1}{2}$ miles, E. $\frac{1}{8}$ N., of the northern of Hippogriffe rocks, and S.S.W. $\frac{1}{3}$ W. 17 miles from Shoalwater island lighthouse.

Turtle shoal, awash, and surrounded by depths of from 8 to 11 fathoms, lies about 2 miles N.E. by E. $\frac{5}{8}$ E. from Hancock shoal, and is of about the same extent. It is usually marked by tide ripples.

Larabe shoal, distant $5\frac{2}{3}$ miles, E. by N. $\frac{3}{8}$ N., from Hancock shoal, is about one-third of a mile in extent, having $2\frac{1}{2}$ fathoms water over it, and 7 to 9 fathoms around.

Sand island, a small patch of sand and broken coral, is about a third of a cable in extent and awash at high water, with depths of from 7 to 8 fathoms around, and lies about $3\frac{2}{3}$ miles, N. $\frac{3}{8}$ W., from Larabe shoal; it is surrounded by a drying reef which extends a cable southward of it. It may be seen from a distance of 3 miles. Lat. 3° 29′ S. Long. 107° 10½′ E.

At a quarter of a mile, E. $\frac{3}{4}$ N, from Sand island, is a shallow patch about one-third of a mile in extent, having $2\frac{1}{2}$ fathoms water over it, and 8 to 9 fathoms around; it is marked by tidal rips.

An oval reef, composed of rock, sand and coral, with $2\frac{1}{4}$ fathoms water over it, lies, E. by N. $\frac{1}{3}$ N., distant one mile from Sand island.

Padang reef, two small reefs close together with 7 feet least water over them, lies about $1\frac{3}{4}$ miles, W. by N. $\frac{1}{2}$ N., from Sand island and nearly midway between there is a patch on which the depth is 3 fathoms.

Haaijen reef, situated, W. $\frac{1}{2}$ S., distant $3\frac{1}{4}$ miles from Sand island, consists of two coal patches lying in a north and south direction from each other, the southern having $2\frac{1}{2}$ and the northern 6 fathoms water over them and depths of from 6 to 8 fathoms around.

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Chart, 2,137 [2,550]. Var. 1° 0′ E.

Middle reef, lying N.N.E. ¾ E., distant nearly 2¼ miles from Sand island, is very similar to it and is covered at high water, but at other times it may be seen from a distance of 3 miles.

Branding breakers, lying north-west, nearly 1¾ miles from Middle reef, are two small patches which are nearly dry at low water and lie 2 cables apart in an east and west direction; they have from 8 to 11 fathoms water between and around them.

Lat. 3° 27′ S. Long. 107° 0½′ E.

Fairlie rock lies W. ⅞ N., distant 10¼ miles from Sand island, with Shoalwater lighthouse bearing N.E. by E., distant 15 miles, and the island just in sight from the deck. It is a coral rock about 2 cables in diameter, nearly awash at low water, with 3 feet over it, if the sea is smooth, and from 8 to 9 fathoms close around. The sea breaks over the rock, and all around are overfalls caused by the rocky and uneven character of the bottom, particularly to the north-eastward. Shoalwater island lighthouse, bearing E.N.E., leads midway between it and Blas Mateu rock.

Lat. 3° 22′ S. Long. 106° 56′ E.

Blas Mateu rock, consisting of three small reefs of rocks and coral with a least depth of 1½ fathoms over it, lies in the fairway track of vessels proceeding through Gaspar strait by Macclesfield channel. It sometimes shows discoloured water and lies with Shoalwater island bearing E. by N., distant 17 miles.

SHOALWATER (Sie Miedang) ISLAND, 10 miles N. by E. ¼ E. from Sand island, is 4 cables in length and 3 in breadth, and overgrown with high trees which may be seen from a distance of 15 miles; it is surrounded by a reef which extends about 4 cables. Detached reefs lie off the eastern side at a distance of one mile.

Hancock island is about half a cable in diameter, and lies three-quarters of a mile north north-eastward of Shoalwater island. Off its north-east side a reef extends about one-third of a mile, and off its north-west side about three-quarters of a mile, with some rocks above water on its outer edge. A patch of 3 fathoms lies 4 cables off the west edge of the reef.

Lat. 3° 19′ S. Long. 107° 13′ E.

LIGHT.—Near the centre of the island a sixteen-sided iron tower, 215 feet in height and painted white, exhibits, at an elevation of 200 feet above high water, a *white flashing* light with a period of system of *fifteen seconds*, which shows a *flash* of *three seconds* duration and should be visible in clear weather, from a distance of 20 miles. A stone dwelling is situated near the lighthouse.

Twee-Fathom reef, with 2 fathoms water over it and 6 to 12 fathoms around, lies W. ½ N., nearly 2 miles distant from Shoalwater

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island. A patch, with 3 fathoms water over it, lies about three-quarters of a mile westward of the lighthouse. Chart, 2,137 [2,550]. Var. 1° 0′ E.

Embleton rocks, 2 miles, N.W. by N., from Shoalwater island, are two coral reefs lying close together in a north and south direction; the southern or larger a rock, which dries at half tide may, at low water, be seen from a distance of 3 miles. The northern reef has a least depth of 4 feet over it, and they are surrounded by depths of from 9 to 13 fathoms. In 1901 the rocks were well marked by a wreck.

Bliss shoals, N. ¾ W., distant 2½ miles from Shoalwater island, are a cluster of four coral reefs close together with 3 feet least water over them; eastward of the reefs the depths are from 8 to 10, and westward from 14 to 15 fathoms. A patch of 3 fathoms lies nearly midway between Bliss shoals and Hancock island.

VANSITTART SHOALS are three groups of coral reefs extending 10 miles south-westward of Bakau island, on the east side of Macclesfield channel, and occupying a space 6 miles in length in a north and south, and 4 miles in breadth in an east and west, direction.

The southernmost group consists of three patches; two to the eastward lie close together, the eastern being awash at low-water, spring tides. The western, lying W. by N., distant 2½ miles from the other, has 4 feet water over it, from which the west point of pulo Liat bears N. ⅝ W. and Baginda hills W. by N. Lat. 3° 10′ S. Long. 107° 6′ E.

The middle group includes four reefs, lying close by each other over a space of 1¼ miles: the two southern reefs are awash at low water, and the other two have 3 feet and 2 fathoms water over them respectively.

The northern group is composed of three reefs, the two eastern being 2 miles apart; the western is awash at low water, spring tides, and lies with the west point of pulo Liat bearing N. by W. ⅔ W., and the south-east side of Kalangbue N.E. by E. ¼ E.

From the eastern reef Slemar is in line with the east side of pulo Liat bearing N. ½ W.

For the marks to clear Vansittart shoals, *see* directions, page 507.

GEORGE BANKS is the name given to the banks lying southward and south-westward of Murung point, pulo Lepar.

Drievadems bank is 2½ miles in length, in a north-east and south-west direction, and one mile in breadth, within a depth of 5 fathoms. The least depth, 2½ fathoms, on the north-east end, lies with Murung point bearing N. ⅜ W., distant 6¼ miles. Lat. 3° 8½′ S. Long. 106° 51¼′ E.

General chart, 2,149 [2,548].

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Chart, 2,137 [2,550]. Var. 1° 0′ E.

Rocky point hill open eastward of Murung point, bearing N. by W. ½ W., leads eastward of the bank.

About 2 miles, W. ½ N., of the bank is a small patch with 4½ fathoms water over it, and 1½ miles northward of the north-east patch there is a small shoal on which the depth is 4¾ fathoms.

Falcon bank has a least depth of 1½ fathoms over it, from which Pergam or Round island bears N. ¾ W., distant 2 miles. From this position the bank, with general depths of from 3½ to 4 fathoms, extends about one mile east-north-eastward and 6½ miles south westward, fronting Lepar strait. On the southern extreme is a patch of 3 fathoms, with Baginda hills bearing N.W. ⅞ W., distant 5½ miles.

Lat. 3° 14½′ S. Long. 106° 53¾′ E.

Sandbanks.—At 12¾ miles south of Murung point is a patch with a depth of 5 fathoms over it; and at 2½ miles W. ½ S. of this is another of the same depth.

Lat. 3° 18½′ S. Long. 106° 43½′ E.

A doubtful bank, with 4½ fathoms water over it, reported to lie south from Baginda hills, was unsuccessfully searched for by H.M.S. *Saracen*. Other banks may exist in this neighbourhood, which has not been properly surveyed.

The dangers off the south coast of Banka have been described with Banka strait *See* page 468.

MACCLESFIELD CHANNEL.— Macclesfield channel, the best route through Gaspar strait, is provided with two lights, but the dangers are not buoyed; there are, however, sufficient objects for cross bearings by which they may be easily avoided. Its approach from the southward is bounded on the eastern side by Hippogriffe and Fairlie rocks, and Vansittart shoals; and on the western side by George banks. Blas Mateu rock lies right in the fairway.

EAST COAST of BANKA.—From tanjong Baginda (page 468), the south-western limit of Gaspar strait, the coast of Banka trends northward 4¾ miles to Roe point, forming the west side of Lepar strait; thence it recedes and forms a bay, the northern limit of which is Berikat point.

The coast is low and either consists of sandy beaches or is overgrown with mangroves, and near Berikat point there are two hills, the Saddles and Telok Batu; the former 912 feet above high water.

There are several small rivers upon this part of the coast, the principal of which is the Kapa or Kepo, sometimes visited by coasters; except two villages, lying inland, there are no inhabitants.

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Berikat point, the north-east extreme of Banka island, and the north-west limit of Gaspar strait, is a rocky tongue of land, nearly 1½ miles in breadth, round which at a short distance off shore lie some granite rocks above water. The point is formed by Berikat hill, which has two summits, the eastern and higher being 394 feet above high water. A rock, 28 feet above high water, lies close off the north-east extreme of the point. Chart, 2,137 [2,550]. Lat. 2° 34′ S. Long. 106° 51½′ E. Var. 1° 10′ E.

Berikat bank fronts the eastern shore of Banka island from Lepar strait to Berikat point, from which point it extends 4 miles in a south-south-east direction, having 1½ fathoms upon its outer edge, which is named Nutshorn bank, decreasing suddenly from 10 fathoms in places.

Wilson bank, on the eastern edge of Berikat bank, is about 1½ miles in length in a north-north-west and south-south-east direction, within the 5-fathoms contour line, and has a least depth of 7 feet over its southern part, and 6 fathoms close-to, with Berikat point bearing N.N.W., distant 6⅓ miles.

Lepar strait, between Banka and pulo Lepar, is 7 miles wide at the south-east entrance, but narrows to 1⅓ miles abreast Roe point. This entrance is barred by a flat, which extends right across, with a depth over its centre of about 2 fathoms, between banks which dry at low water; the northern entrance has about the same depth. The strait, therefore, is only available for small craft, with local knowledge.

Three islands lie within the north entrance of the strait, Tingie island, the largest, with a sugar-loaf shaped peak, being 915 feet above high water. Lat. 2° 59′ S. Long. 106° 42½′ E.

Pulo Lepar, an irregularly shaped island, about 12 miles in length in an east and west direction and 10 miles in breadth, separated from the east coast of Banka by Lepar strait, is generally flat and densely wooded; the chief town is Labu on the north-east side. On its southern part are several ranges of hills of moderate elevation, viz.:— Six-peaked range, 781 feet; Mujuk or Maroon hill, 850 feet; Four-peaked range, 750 feet; and two hills not named on the chart, 650 feet; near its western end is False Sugar-loaf, a hill 700 feet above high water.

Murung or Entrance point, the south-eastern extreme of pulo Lepar, is rocky and the termination of the hills along the south coast of the island; close to the eastward of the point are some rocks above water, and to the southward of these, on the coast reef which is only a short distance off the point, there is a reef dry at low water. Lat. 3° 2′ S. Long. 106° 54½′ E.

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

Pergam or Round island, an islet surrounded by reefs, lies about 2 cables off Pergam point, on the south coast of the island.

Water.—Northward of Murung point the coast forms a bay where water may be obtained from two streams, which, although slightly tinged with a red colour, produces no ill effects.

Anchorage.—Vessels may anchor about one mile north-eastward of Murung point, abreast of which position is a sandy beach.

Labu or Rocky point, the north-east extreme of pulo Lepar, is low, and 2 miles westward of it is Rocky point hill, 522 feet above high water.

The coast between Murung and Rocky points is fronted by a coral reef, which midway extends off to the distance of 1½ miles and is "steep-to"; its outer edge is about three-quarters of a mile north-eastward of Rocky point, increasing its distance off shore towards the north point of the island to 1½ miles.

Lat. 2° 57′ S. Long. 106° 55′ E.

LIGHT.—On Labu point, a *white fixed* light is exhibited, at an elevation of 49 feet above high water, from an iron framework 35 feet in height and painted white; it should be visible, in clear weather, between the bearings of N. 5° E., through north and west, to S. 14′ E., from a distance of 8 miles. The keeper's stone dwelling is near the lighthouse.*

Kilapan and Senior are two hilly islands lying 3 miles northward of pulo Lepar. Kilapan is about 1¾ miles in length in an east and west direction, and three-quarters of a mile in breadth; Senior, lying 1¾ miles to the westward, is somewhat smaller.

Klippige shoals, four in number, having rocks above water, lie off Labu point. The outer, consisting of two rocks above water, lies N.E. by E. ⅞ E., distant 2 miles, and the southern shoal, with a depth of 4¾ fathoms over it, S.E. by E. ¾ E., 2¼ miles from Labu point lighthouse.

The inner reef, lying one mile E. by N. of the point, is half a mile in length with rocks above water on its north and south ends. About a third of a mile south-eastward of this is another reef, about the same size, with rocks above water lying on its northern part.

Close to these shoals are depths of from 10 to 13 fathoms.

Batu Denem, an isolated rock which dries one foot at low water, spring tides, lies N. ½ W. distant one mile from Labu point lighthouse, and North, distant 2¼ miles, a patch of 4 fathoms is charted.

General chart, 2,149 [2,548].

* To be altered to *white flashing* every *three seconds*, showing light, *one second*; eclipse, *two seconds*.

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Discovery rocks, lying near the centre of Macclesfield channel, and N.N.E. ½ E., distant 4¼ miles from Labu point lighthouse, are two rocks, which dry at low water, and are about half a cable apart in a north-north-east and south-south-west direction; about 2 cables eastward of these rocks there is a bank, with from 2 to 4 fathoms over it, and westward of them a shoal on which the depth is 4 fathoms. Close to the rocks and banks are depths of from 8 to 14 fathoms. Chart, 2,187 [2,550]. Var. 1° 5′ E.

A rocky patch, with a depth of 3 feet over it, lies 2 miles, W. ¾ S., from Discovery rocks, with depths of from 12 to 16 fathoms between.

PULO LIAT or **Middle island,** a wooded island which separates Macclesfield and Clement channels, is about 5¾ miles in length, in a north and south direction, and 4¾ miles in breadth. It is flat at its northern part, but to the southward there are several hills, 400 to 600 feet above high water; and Putat hill, on the south side, is 613 feet. A coast reef, drying in most places, surrounds the island, and outside it are several dangers.

Pulo Chilagin, or **Jelaka,** is an islet lying on the coast reef, about 2 cables westward of the west point of pulo Liat.

LIGHT.—On the west point of pulo Chilagin, a *white fixed* light is exhibited, at an elevation of 52 feet above high water, from an iron frame, 51 feet in height and painted white; it should be visible between the bearings of N. 28° W. (through north and east) to S. 28° W. from a distance of 11 miles in clear weather. A stone dwelling is situated near the light structure. Lat. 2° 52½′ S. Long. 107° 1′ E.

Water.—Near the west point of the island is Liat village, where good fresh water may be obtained; also in the bay, half a mile northward of Whitewashed point, the south east extreme of the island.

Dangers.—Off Whitewashed point, the south-east point of the island, are outlying rocks and dangers extending in a S. by W. direction for nearly 3 miles, to the 5-fathoms contour line.

Three reefs lie off the south-west coast; the southern, with 2 feet water over it, is situated W.S.W., distant 2 miles from Whitewashed point; the middle reef, outside the 5-fathoms contour line, has a depth of 1¼ fathoms over it, and is one mile N.W. by W. from the first.

The northern reef, with 2½ fathoms least water over it, is S. by E. ½ E., distant one mile from the lighthouse.

A small reef awash lies half a mile westward; a reef with 2 feet water of it one mile north-westward, and a reef, which dries at low water,

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

$1\frac{2}{10}$ miles, N. by W., of the lighthouse; and there are other reefs in this locality and off the north-west coast where they extend to a distance of $1\frac{1}{3}$ miles, with some dry sand banks between them and the coast reef.

Alceste reef, $1\frac{1}{2}$ miles north-eastward of the north point of pulo Liat, is one mile in length in a north-north-east and south-south-west direction and has 2 fathoms water over its southern part with a small patch of 2 feet; on the north end of the reef there is a depth of 4 feet, and 7 to 11 fathoms along its western side.

A reef with 2 fathoms least water over it, and depths of 8 to 10 fathoms around, is situated 3 cables north-eastward of Alceste reef.

Pulo Chilagin lighthouse, bearing S. by W. $\frac{1}{4}$ W., leads half a mile westward of these dangers.

Many vessels have been lost on this reef, or on some of the coral patches contiguous to it, all of which are "steep to."

Off the north-east coast of pulo Liat, besides the reef projecting from the shore, are numerous coral patches extending 2 miles from the island, several of which dry.

The eastern coast of pulo Liat is fronted by a coral reef to the distance of half a mile in places (for off-lying dangers, *see* page 511). Close northward of the eastern extreme, and upon the shore reef, is an islet named pulo Anak, or Selagin.

Lat. 2° 51′ S. Long. 107° 6′ E.

Sandringham reef, with 7 feet water over it, is the northern of these patches, and lies with the north end of pulo Liat bearing S.W. $\frac{1}{4}$ W., distant 2 miles; a small reef, with 3 fathoms water over it, lies one-third of a mile eastward of it; both reefs are "steep-to."

The outermost danger on the north-east coast is a small reef, with one fathom water over it, which lies with the north point of pulo Liat bearing W. $\frac{3}{8}$ N. and pulo Anak S. by W. $\frac{1}{2}$ W.

A large coral reef, which dries, lies one mile to the southward of the preceding danger, and 4 cables eastward of pulo Anak there is a small coral bank with $2\frac{3}{4}$ fathoms water over it.

Clearing marks.—A vessel will pass eastward of these dangers by keeping Whitewashed point bearing westward of S. by W. $\frac{1}{2}$ W., or Klemar island bearing S.E. $\frac{3}{4}$ S.

Coral bank, which is just awash, is the outermost danger on the south-east coast of pulo Liat; it lies with Whitewashed point bearing S.W. by W. $\frac{3}{4}$ W., distant $1\frac{1}{2}$ miles. Three small coral reefs lie close to this coast.

Whitewashed point, bearing W. by S., leads southward of the bank; and pulo Anak, N.W. by N., leads north-eastward.

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BOOMPJES ISLAND, distant 9½ miles N.E. ⅜ E., from Berikat point, is a rock 40 feet above high water, with a few trees on the summit, rendering it visible from a distance of about 10 miles. It is surrounded by a coral reef which, off the south side, extends half a mile with a rock above water on it. There is a cave upon this island where the Malays collect edible birds' nests, which are probably found also on the other islands. Chart, 2,137 [2,550]. Var. 1° 5′ E.

A small coral reef, with 4 feet water over it, and 6 to 10 fathoms around, lies half a mile, E. ½ N., of the island.

GASPAR ISLAND, lying N. ⅛ E., distant 24 miles from the north point of pulo Liat, is 1 6/10 miles long in a west-north-west and east-south-east direction, nearly a mile broad, and thickly wooded. Its centre rises to a peak 812 feet above high water, which may be seen in clear weather from a distance of 32 miles, and is the principal mark for avoiding the shoals in sailing to or from the northern part of the strait. It is surrounded by a reef, which projects from the south and east points of the island about a third of a mile. Lat. 2° 24½′ S. Long. 107° 5′ E.

Water.—Fresh water is to be found upon this island.

Glassa rock, 24 feet above high water, lies about one mile westward of Gaspar island. It is surrounded by a reef, extending about one-third of a mile south-eastward from it, but not quite so far in other directions.

Gaspar island, Glassa rock, and Boompjes island form the northern limit of Gaspar strait. Canning rock, Warren Hastings reef, and other dangers are described in pages 536–539.

Anchorages.—In the southern part of the strait anchorage in from 8 to 9 fathoms water may be obtained north-north-eastward of Drievadems bank, between the bearings of Murung point N.W. by W. and Baginda hills, nothing northward of W. ⅓ N.

Off the coast of pulo Lepar anchorage may be taken up between Murung point and Labu point, bearing N.W.; near Murung point in 7 fathoms water, and more to the northward, with Murung point not bearing nothing southward of S.W. ½ S., in depths of from 8 to 9 fathoms.

There is also anchorage under the coast of pulo Liat in from 8 to 10 fathoms water, with pulo Chilagin bearing N. by W. ⅞ W. and Labu point between West and W. by S. ⅓ S.

In the northern part of the strait anchorage may be obtained off the coast of Banka, with pulo Chilagin bearing between E. ¼ N. and E. by S. ¼ S. in 8 fathoms water, or to the northward in a depth of 7 fathoms.

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

Currents.—The currents greatly depend upon the strength of the monsoon. When the monsoon is strong, the current will generally be found setting in the same direction at the rate of 2 or 3 knots an hour, but affected somewhat by the tidal streams.

Pilots for Gaspar strait may be obtained at tanjong Pandan, the chief town of Belitung.

Directions.—Macclesfield channel from the southward.—Macclesfield channel presents no difficulties to a steam vessel or a sailing vessel with a fair wind, but in thick weather, or if uncertain of the vessel's position, the entrance of Gaspar strait should be approached with caution, keeping a good lookout for broken or shallow water.

Having followed the directions, page 453, for passing the Two Brothers and North Watcher, a vessel may steer to pass 4 miles westward of Hippogriffe rocks, and then N. $\frac{3}{8}$ E. to the westward of Blas Mateu, having passed which steer between Drievadems bank and Vansittart shoals.

Lat. 3° 34½′ S. Long. 106° 55½′ E.

Caution must be exercised when in the vicinity of Hippogriffe and Blas Mateu rocks, observing that the Six-peak range on pulo Lepar, kept N. $\frac{3}{8}$ W., will lead 4 miles westward of Blas Mateu rock; and when Baginda hills bear N.N.W. $\frac{1}{2}$ W., and the water has deepened from about 8 fathoms to 12 or 15 fathoms, steer to the north-eastward until Rocky point hill is well open eastward of Murung point, bearing N. by W. $\frac{1}{2}$ W., which will lead eastward of George banks.

Or, it might be convenient for a sailing vessel to make Murung point on a N. by E. or N.N.E. bearing, passing westward of Drievadems bank, observing, however, that the 4½-fathoms patch, to the westward of the bank, lies between these bearings. Steering for Murung point, bearing N. $\frac{7}{8}$ E., will lead between Drievadems bank and this patch, and for it, bearing N. by E. $\frac{7}{8}$ E., to the westward of the patch. Labu point, in line with Murung point bearing N. $\frac{1}{2}$ E., clears Drievadems bank, passing to the westward, and Falcon bank, passing to the eastward.

From abreast Murung point, pulo Chilagin or Jelaka light may be steered for, bearing N.N.E. or northward of that bearing, which leads eastward of the dangers off pulo Lepar. When about 3 miles from the light, steer to pass about midway between the shoals westward of it and Discovery rocks, whence course may be gradually altered for Gaspar island. *Continued at* page 539.

Working through from the southward. — During the strength of the north-west monsoon it is almost impossible to work through Gaspar strait; even in the latter part of the monsoon, about March, when the winds are light, sailing vessels often are obliged to anchor on

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account of the strength of the southerly current. In the south-east monsoon also, vessels will often meet with light variable winds, rendering it impossible for them to preserve a direct course. Chart, 2,137 [2,550]. Var. 1° 5′ E.

The approach to Macclesfield channel does not afford convenient objects as marks to keep vessels clear of danger, but the following directions are given as being, so far as can be judged, the best for that purpose.

As, however, some of the objects are at a considerable distance from the dangers, navigators are cautioned not to depend too implicitly upon having made out, or being able to make out, such distant objects, but rather to rely upon a more general exercise of judgment, paying attention to the soundings, frequently referring to the chart, &c. It is indispensable that the greatest vigilance be observed, with a careful regard to the set of the tidal streams and currents, in order to work a vessel safely through this channel.

Standing to the eastward.—A vessel being northward of Hippogriffe rocks may stand to the eastward towards Sand island (which is just awash at high water) until it is but 4 miles distant, or within half a mile of Haaijen reef, giving Blas Mateu and Fairlie rocks a wide berth. Shoalwater island, bearing N.N.E. $\frac{5}{8}$ E., leads one mile westward of Branding breakers. This island should not be approached nearer than 3 miles, on account of the dangers lying westward of it. Lat. 3° 34½′ S. Long. 106° 55½′ E.

Murung point kept northward of N.W. ¼ N. leads south-westward of Vansittart shoals; and Kalangbue island summit, bearing N.E. ¾ E., leads north-westward of their southern portion. Putat peak, on pulo Liat, kept eastward of North, leads westward of the north-west portion of Vansittart shoals; and Auer island open northward of Bakau island, E. by N. ½ N., leads northward of them.

Being northward of Vansittart shoals, Bakau island must not be brought to bear southward of E. by S. ½ S., nor Slemar island westward of North, to avoid the shoals between those islands; and to clear the patches lying southward of pulo Liat, keep Kwil island bearing eastward of E. by S. ½ S., or Putat hill northward of N. by W.

To clear the reefs southward of pulo Chilagin, Whitewashed point should be kept open of Middle point, bearing E. ¼ S., until pulo Chilagin bears N.N.E. (light in sight at night); and to avoid the reefs westward of that islet, keep Middle point bearing eastward of E.S.E. until pulo Chilagin bears East. Pulo Chilagin bearing East also leads northward of Discovery rocks.

To avoid the reefs extending off the north-west side of pulo Liat, keep Rocky point bearing southward of S.W. by S. until pulo Kilapan bears S.W. by W. ½ W.

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

The lights on pulo Chilagin and Labu point afford ready means of fixing the position of a vessel at night.

Standing to the westward.—To clear Drievadems bank southward of pulo Lepar, keep Rocky point hill open eastward of Murung point, bearing N. by W. ½ W., until Baginda hills bear W. ½ N., when a vessel may stand over until Murung point bears N. by E. ½ E.

To clear Klippige shoals, do not bring Murung point to bear southward of S.W. ½ S. until the north extreme of Kilapan island bears N.W. ½ W.

When standing towards Discovery rocks, do not bring Rocky point light southward of S.W. ¾ S. until pulo Chilagin bears East, when a vessel will be northward of the dangers, and may stand westward toward the bank into a depth of 8 fathoms until near Wilson bank.

Lat. 2° 36½′ S. Long. 106° 42′ E.

The Saddles, two hills 912 feet above high water, on the Banka coast, bearing N.W. by W. ¾ W., or mount Pading W. ¾ N., lead about 1½ miles southward of Wilson bank; and the extreme of Berikat point, N.W. by N., leads one mile north-eastward of that danger. *Continued at* page 539.

Macclesfield channel from the northward.—In the early part of the north-east monsoon, northerly and north-westerly winds prevail about the entrance of Gaspar strait, when strong south-easterly currents will generally be experienced between Gaspar island and pulo Liat.

It appears certain that the frequent accidents which formerly happened to vessels in the vicinity of Alceste reef arose principally from neglecting to guard against the effects of this current. A vessel, therefore, intending to proceed to the southward through Macclesfield channel, and having passed from one mile to 2 miles eastward of Gaspar island, should steer to the south-westward until Gaspar island bears N. by E. ¼ E., upon which bearing it should be kept until pulo Kilapan is S.W. by W., the north point of pulo Liat S.E. by E., and pulo Chilagin in sight. Here a vessel will be in the fairway of the channel, and may steer South, carefully guarding against the effects of tidal streams or currents by frequent cross-bearings, passing midway between Discovery rock and pulo Chilagin.

The directions from southward, reversed, will apply to the remainder of the channel.

Working through from the northward it will generally be advisable to get over towards the Banka coast as soon as possible, where a vessel will be more in the fairway of the channel, and will

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find more convenient depths of water for anchoring if it should be necessary. Chart, 2,137 [2,550]. Var. 1° 5′ E.

By night it is generally advisable to anchor in from 7 to 10 fathoms water on the bank to the southward of Gaspar strait.

Being to the northward of Hippogriffe reef and with Shoalwater island light just in sight, bearing E.N.E., the vessel will be to the southward of Blas Mateu and should steer N. by W. to pass westward of it. Having cleared this danger a N.N.E. course will lead between Drievadems bank and Vansittart shoals, not shoaling to a less depth than 12 fathoms towards the former danger.

When Shoalwater island light bears S.E. by E. alter course to N. ½ E. for pulo Chilagin, taking care not to shoal the water to less than 10 fathoms, towards pulo Lepar, until Labu point and pulo Chilagin lights are in sight, after which steer to pass 2 miles westward of pulo Chilagin.

CLEMENT CHANNEL is narrower and more encumbered with dangers than either Macclesfield or Stolze channels, between which it lies, but is easily navigable by steam vessels or sailing vessels with a fair wind.

Islets and dangers.—Bakau (Low island) and Kalangbue (Saddle island) are two small islands nearly one mile apart, about half a mile in diameter, lying in a south-east direction, distant about 8 miles from pulo Liat. Bakau island, the western, is flat, wooded, 123 feet above high water, and surrounded by a coral reef, which, from the north-west and south-east sides, extends about 3 cables and mostly dries. Near the coast reef lie some detached reefs; the southern of the three on the eastern side has 1½ fathoms, and the other two 4 feet water over them; two on the south side have depths of 4½ and 3½ fathoms. Lat. 3° 2′ S. Long. 107° 9¼′ E.

Kalangbue island has two hills forming a saddle, the western hill being 210 feet, and the eastern 266 feet above high water; it is surrounded by a coral reef which generally dries, round which there are depths of from 8 to 14 fathoms.

De Brauw reef, a small portion of which dries, is 6 cables in length in a north and south direction and 3 cables in breadth; the north point of the reef bears N.E. ¾ E., and the south point E. ½ S. from the north point of Kalangbue. It has 16 to 18 fathoms close-to, and depths of from 14 to 18 fathoms in the small channel between it and Kalangbue island. Lat. 3° 1′ S. Long. 107° 11½′ E. Var. 1° 5′ E.

Slemar island (Sand island), 3½ miles north-westward of Bakau island, is small, low, wooded, and surrounded by a reef which

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

extends to a distance of 4 cables from its south point, and dries; around this reef there are depths of from 6 to 9 fathoms.

Midway between Slemar and Bakau islands there is a reef, half a mile long in a north-east and south-west direction, and a cable broad, which is nearly all dry at low water; it has depths of from 7 to 8 fathoms around.

Kwil island (Barn island), about 1½ miles eastward of Slemar island, is flat, about a third of a mile in diameter, wooded with tall trees, and 154 feet above high water; it is surrounded by a small sandy beach and a reef extends to the distance of one-third of a mile from its north-east side, which has from 7 to 9 fathoms close-to.

A reef, with 2 feet water over it, lies 4 cables, and one, drying at low water, 7 cables southward of the island; both reefs are "steep-to."

Lat. 2° 59½′ S. Long. 107° 14½′ E.

Auer island, on the east side of Clement channel, lies 10 miles from Whitewashed point, the south-east point of pulo Liat. It is about one mile in diameter, generally hilly and covered with large trees, and the highest hill, which has a peculiarly sharp summit, is 200 feet above high water; it is surrounded by a steep reef, which generally dries, extending about half a mile, with 8 to 12 fathoms around.

Close to the western edge of the coast reef lies a small reef with 3 feet water over it, and near the south-west extreme there is a small patch of 4½ fathoms. Southward of the island a reef, drying at low water, extends for a distance of a mile, and beyond it, in a south-east direction, there is a reef on which the depth is 2½ fathoms.

Gresik island (Table island), lying 2 miles eastward from Auer island, and bordering Stolze channel, is described on page 518.

Klemar island (North island), 240 feet above high water, lying 1½ miles northward of Auer island, is also hilly, covered with large trees, and surrounded by a reef, to the distance of 2 cables at its east end. At three-quarters of a mile E.N.E. from the island is a reef dry at low water, with 15 fathoms around it.

Outside the coast reef a reef, with 1¼ fathoms water over it, lies close southward of the west point, and a reef, on which the depth is 2¼ fathoms, is situated 6 cables southward of the east point.

Sunken rock.—A sunken rock one cable in length in a north and south direction, lies W. by S., distant 2 miles from the south-west point of Klemar island, in the middle of the fairway of Clement channel; there is one small patch of 9 feet, otherwise the depths over it are from 2 to 2½ fathoms, and it is surrounded by depths of from 14 to 17 fathoms. The south point of Gresik island, just open of the north point of Auer island, bearing about E. by S. ¾ S., leads 3 cables northward of this danger.

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Akbar shoal, lying at the northern entrance to Clement and Stolze channels, is dangerous; it does not show by discoloured water, but its position may be seen by tidal rips. It is composed of sand and coral, is about half a cable in diameter, has a least depth of $1\frac{1}{2}$ fathoms over it, and is surrounded by depths of from 7 to 9 fathoms, which quickly increase to 18 and 20 fathoms. From it Gaspar island bears N.W. $\frac{5}{8}$ N., Ayer Lanchu S.S.E., and Whitewashed point S.S.W. $\frac{3}{4}$ W. Chart, 2,137 [2,550]. Lat. 2° 39′ S. Long. 107° 15¼′ E. Var. 1° 5′ E.

Middle Pass shoals are three coral patches lying close together and extending nearly one mile in a north-east and south-west direction; the two western dry in places, the third has 2 feet water over it. From their south extreme, which dries, Whitewashed point bears N.W. by W. $\frac{1}{2}$ W. distant $2\frac{3}{4}$ miles. A ridge of sand and clay about 3 cables in breadth, with 8 to 9 fathoms water over it, extends a mile southward of Middle Pass shoals, its south extreme being with the south end of Gresik island in line with the north end of Auer island, bearing E. by S. $\frac{3}{4}$ S. Kwil island, bearing S. $\frac{1}{2}$ W., leads 4 cables eastward, and S. by E. $\frac{2}{3}$ E. the same distance westward, of the shoals. Lat. 2° 55¾′ S. Long. 107° 8′ E.

Hewitt shoal, composed of coral and about a cable in diameter, with a depth of $2\frac{1}{2}$ fathoms over it and 14 to 17 fathoms close-to, lies with the west point of Klemar island bearing S. by E. $\frac{1}{8}$ E. distant 5 miles. The west point of Auer island will be open westward of Klemar island.

The summit of Auer island open eastward, bearing South, or westward of Klemar island, S.S.E. $\frac{1}{4}$ E., leads clear of Hewitt shoal.

Anchorages.—South of Kalangbue, there is anchorage in from 9 to 10 fathoms water, over sand, about 2 cables from the edge of the coast reef, between the east point of the island bearing North and the south-west point W.N.W.

About midway between Auer and Klemar islands, eastward of a line joining their west points, there is good anchorage in from 9 to 10 fathoms water, avoiding the reefs already mentioned.

Anchorage may also be obtained in 8 to 9 fathoms water, over sand and clay, about half a mile southward of Middle Pass shoal on the ridge that extends southward from it, with the south point of Gresik island in line with the north point of Auer island bearing E. by S. $\frac{5}{8}$ S., and the west point of Bakau island on with the east point of Kwil island, S. by E. $\frac{1}{8}$ E.; this anchorage is just on the western side of the ridge.

Directions.—Proceeding through Clement channel from the southward, having passed midway between Fairlie and Blas Mateu rocks, from which position Shoalwater island lighthouse should be seen bearing Lat. 3° 24½′ S. Long. 106° 58′ E.

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

E. by N. $\frac{7}{8}$ N., steer about N.E. $\frac{1}{2}$ N. to pass 6 or 7 miles north-westward of it. When the summit of Auer island is made out, bring it to bear N. by E. $\frac{1}{2}$ E.; or Shoalwater island, brought to bear South and kept astern, will lead in the fairway to Auer island.

Approaching Auer island on a N. by E. $\frac{1}{2}$ E. bearing, the depths will be 9 to 14 fathoms until well up with Bakau island, when they will deepen to 20 fathoms, and to 25 or 30 fathoms when abreast of Kalangbue island. When Kalangbue island bears West, steer N. by W., passing about one mile westward of Auer and Klemar islands, eastward of De Brauw reef, off the north-eastern side of Kalangbue island, and midway between Klemar island and the sunken rock reef lying 2 miles, W. by S., of it.

When the north extreme of Klemar island bears East, steer N.W. by N. to pass between Middle Pass shoals and Hewitt shoal, and when White-washed point bears W.S.W., a N. $\frac{3}{4}$ W. course may be shaped for Gaspar island.

Lat. 3° 1½′ S. Long. 107° 10½′ E.

Kalangbue island bearing S. $\frac{1}{2}$ E. leads midway between Kwil island and the sunken rock westward of Klemar island, and between Middle Pass shoals and Hewitt shoal; thence course may be shaped to pass eastward or westward of Akbar shoal. Coming from the northward, the directions should be reversed.

Working through.—No vessel would from choice attempt to work through Clement channel, as Macclesfield and Stolze channels are much better adapted for that purpose; but it is possible that a vessel, embarrassed by light baffling winds, may find it convenient to proceed through some part of it. The numerous islands afford every facility for fixing the position of the vessel from time to time.

MIDDLE PASS, which unites Macclesfield and Clement channels, is formed by Slemar island, Kwil island and Klemar island, with the sunken rock westward of it, on the south-east; and by the dangers projecting from the southern extreme of pulo Liat and Middle Pass shoals on the north-west.

Directions.—To proceed from Macclesfield channel through Middle Pass from the south-westward, steer between Murung point and Vansittart shoals towards Slemar island, the channel between which and the shoals extending from the southern end of pulo Liat is clear, with depths of 14 to 20 fathoms; Murung point kept bearing W. by S. $\frac{3}{4}$ S. will lead through in mid-channel, and at about one mile northward of Slemar island.

In working through, the following clearing marks may prove useful:—The east extreme of pulo Liat bearing North clears the dangers extending from the west side of Slemar island and southward of pulo Liat; Kwil

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island E.S.E. leads southward of the latter; Middle point N.W. by W. $\frac{3}{4}$ W. leads south of the Middle Pass shoals; and the north extreme of Kwil island W.S.W. leads northward of the sunken rock lying westward of Klemar island. Chart, 2,137 [2,550]. Var. 1° 5′ E.

STOLZE CHANNEL. — General remarks. — Stolze channel presents no difficulties to a steam vessel or a sailing vessel with a fair wind. It has one light, but no beacons or buoys, excepting one beacon on Teree reef north-westward of pulo Selic, but there are many islets by which the position of a vessel may be checked when necessary for the avoidance of dangers.

The southern entrance is bounded on the west by Shoalwater island and the reefs southward of it described on page 498, and on the east by pulo Selio, Carnbee rocks, and other shoals. These latter shoals are much against this channel in making it from the southward, for Carnbee rocks—the southernmost of the dangers—lie 20 miles distant from the land, so that in thick or hazy weather, when a vessel might be uncertain of her position, she would not be able to make Belitung island with nearly the same safety that she would be able to make pulo Lepar or the south coast of Banka.

These shoals would appear to form the only drawback to the adoption of this channel, and in fine weather even this would almost disappear, for the hills on Belitung are high, and may be seen at a distance of 30 or 35 miles, and Shoalwater light, on the western side, is visible from a distance of about 20 miles.

DANGERS in southern approach. — East side. — Carnbee rocks, situated S. by E. $\frac{1}{8}$ E., distant 21$\frac{1}{2}$ miles from Gunong Bagenda, are three patches of coral formation; the two southern are 3 cables apart in an east and west direction, the western with a portion dry 5 feet at low water; the eastern has a depth of 1$\frac{1}{2}$ fathoms over it. On the northern shoal, which lies N. by E. $\frac{7}{8}$ E., distant 1$\frac{1}{10}$ miles from the eastern, there is 2 fathoms water, and they are surrounded by depths of 12 to 15 fathoms, over sand and shells, at one cable distant. Lat. 3° 34½′ S. Long. 107° 41′ E.

These rocks are difficult to distinguish at high water, when the sea is smooth, from a distance of more than one cable.

Naga reef, 14 miles south-west of Gunong Bagenda, and composed of rock and coral, is about 50 yards in diameter, and has a least depth of 4 feet over it at low water; it has depths of from 11 to 13 fathoms around, and generally shows by tidal rips but seldom by discoloured water. Lat. 3° 27′ S. Long. 107° 37½′ E.

Anvang bank, about 3 cables in length in an east and west direction and half a cable in breadth, consists of two drying portions. The eastern patch is of sand, the western of large black rocks, some of

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Chart, 2,137 [2,550]. Lat. 3° 24½′ S. Long. 107° 37′ E. Var. 1° 5′ E.

which are visible high water and at low water, and may be seen from a distance of 4 miles; there are depths of from 10 to 15 fathoms close-to. From the western extreme of the bank, Gunong Bolo, on the south point of pulo Selio, bears N.N.W. ¾ W. distant 10¾ miles.

Cooper shoals, a coral reef, 4 cables in length in a north and south direction, lying 2½ miles north-north-westward from Anvang bank, has 4 feet water over it and from 8 to 9 fathoms close-to; it lies with Gunong Bolo bearing N.W. by N. distant 8 miles.

Three feet shoal, composed of coral, is about 2 cables in diameter, and lies with Gunong Bolo bearing N. ½ W. distant 4¼ miles. About half a cable from the reef there is a small patch, with 4½ fathoms water over it, and round both reefs there are depths of from 9 to 12 fathoms.

A small coral patch, with 3 fathoms water over it, lies E. by S. ½ S. distant 8 cables, and another patch, on which the depth is 4 fathoms, S.E. ¼ S., 2 miles from Three feet shoal.

Chart, 2,160 [2,553].

Masar islands consist of three small islands lying 7 miles from the coast in a west-north-west and east-south-east direction from each other; they are covered with high trees, and may be seen from a distance of 12 miles. The westernmost and smallest is about 100 yards in diameter; Kennedy, the middle, is about 3 cables in length and 2 in breadth, and Otan, rather smaller than Kennedy island, lies about 1¾ miles east-south-eastward of it. The islands are surrounded by reefs.

Lat. 3° 19¼′ S. Long. 107° 42′ E.

Other islands and dangers lie to the southward of Belitung (*see* page 516), but they are to the eastward of the track of vessels bound through Gaspar strait.

Chart, 2,137 [2,550].

THE WEST COAST OF BELITUNG (Billiton), forming the eastern limit of Gaspar strait, has a north and south direction for a distance of 43 miles, and is generally low and wooded, and fronted by numerous islands separated by narrow and, for the most part, unnavigable passages. Pulo Selio, with the dangers westward of it; the Lima island group, and pulo Mendanau, the largest of the islands, form the eastern limit of Stolze channel.

Lat. 3° 13′ S. Long. 107° 37½′ E.

Aspect.—At the south-west extreme of Belitung, are the Gunong Bagenda (Haycocks), two remarkable hills, 496 feet above high water, north-eastward of tanjong Kiras; the western has a rather sharp summit, and in clear weather they may be seen from a distance of 26 miles. At 5 miles north-eastward of Gunong Bagenda is Gunong Beluru, 1,166 feet above high water, and to the eastward of Beluru are Luda,

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Pyramid and South peak, all of which serve to determine a vessel's position when approaching the strait from the southward. Chart, 2,137 [2,550]. Lat. 3° 9¾′ S. Long. 107° 41′ E. Var. 1° 5′ E.

At 7 miles northward of Beluru are Dudat or Mubing, 1,198 feet, and Kubing 1,090 feet, above high water; at 11 miles north-north-eastward of Beluru is Agong 1,242 feet, and 7 miles northward of Agong is Liang, 1,096 feet above high water. The whole of the hills just mentioned are visible from the southward and south-westward. At 3 miles south-eastward from tanjong Binga, a high bluff forming the north-western extremity of Belitung, is Gunong Tobalo, the summit of which is 540 feet above high water. Lat. 2° 37½′ S. Long. 107° 41′ E.

Islets and dangers.—Pulo Selio is 3½ miles in length in a north and south direction, with Gunong Bolo, a conspicuous hill, 242 feet above high water, upon its south extreme; it is surrounded by a reef which, on the south-east side, extends for a distance of 3½ miles, with pulo Saribu standing about midway on it. Pulo Saribu is separated from the south-western point of Belitung by a channel about three-quarters of a mile in width, only suitable for small vessels. A reef, 4 miles in length, lies southward of the bank extending south-eastward of pulo Selio.

White rock, 28 feet above high water, lies 2½ miles westward of the south point of pulo Selio and stands on the north-western edge of a drying reef about a mile in length in a north-west and south-east direction, and 4 cables in breadth; two rocks which dry at low water lie on the north and on the south extreme of the reef. Lat. 3° 15′ S. Long. 107° 28½′ E.

A cable to the northward there is a small coral reef with one fathom water over it, and a bank of hard sand, with depths of from 3½ to 4½ fathoms over it, extends 1¾ miles from its south-west side. On the west side of this bank there is a depth of 11 fathoms, quickly deepening to 20 fathoms.

Three patches of hard ground, with depths of from 4¼ to 4½ fathoms over them, lie 2 miles south-south-west from the south point of pulo Selio.

Between these shoals and pulo Selio is a channel about one mile in width, having depths of from 5 to 7 fathoms.

Tiga reef, about a cable in diameter, having 2½ fathoms water over it, and 11 to 13 fathoms close-to, lies N.W. ⅝ W., distant 1⅞ miles from White rock.

Njela reef (Kurier), situated 3 miles, N. ¾ W., of White rock and 3½ miles from the north point of pulo Selio, is 4 cables in diameter, and dries at low water; it is "steep-to," having a depth of 5 fathoms at

General chart, 2,149 [2,548].

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Chart, 2,137 [2,550].
Lat. 3° 12′ S.
Long. 107° 28¾′ E.
Var. 1° 5′ E.

less than a cable from its south side, and there are 10 fathoms at a mile from its west side.

To the southward of the reef lie two small patches with less than 5 fathoms water over them, and near the north side are two small reefs, the southern drying, and the northern with a depth of 2 feet over it.

Anchorage.— Westward of pulo Selio vessels may anchor to obtain water. Gunong Bolo, bearing between E. by S. ¾ S. and S.E. by E., leads between Tiga shoal and Njela bank. The anchorage nearest to the watering place is in 6 or 7 fathoms water, over a bottom of sand and shells, with White rock bearing S.W. ½ S., and the south extreme of pulo Selio, S.E.

Water.—Fresh water is to be found in the northern part of the bay on the west side of pulo Selio. Also a little to the northward of tanjong Tambelan, on the south-west coast of Belitung, there is a rivulet of good water, easily approached by boats.

Tela and Trek reefs, are situated 2½ miles northward of Njela reef, at the south end of the bank, with less than 3 fathoms water over it, which extends 7 miles southward from pulo Mendulok and forms the east side of the channel leading eastward of Lima islands and pulo Mendanau; Teree, the western of the reefs, lies outside this bank, has 3 feet water over it, and is just within the 5-fathoms contour line.

The middle summit of Gunong Bagenda in line with the north point of pulo Selio, bearing E. by S. ¼ S., leads between Teree and Njela reefs in depths of from 4 to 6 fathoms, over soft ground.

Beacon.—An iron beacon, surmounted by a conical topmark, painted black, marks Teree reef.

Zuid reef, lying N.W., distant 3¼ miles from Teree beacon, is about a cable in diameter, with a least depth of one fathom over it and 9 to 13 fathoms around.

Lat. 3° 8½′ S.
Long. 107° 26½′ E.

Inner channel.—The channel eastward of the Lima islands and between them and Mendulok island is entered between Teree and Zuid reefs, and over a narrow ridge, with from 4 to 4½ fathoms water over it, which connects the former reef with reefs stretching 4 miles southward of Nado island.

Sikindang, Sebongkok, and Hoorn are small islands lying on the western side of the channel, the latter island being connected with Mendanau by a reef. Mendulok, Keringan, Ru, and Ringet, are small islands bordering the eastern side of the channel.

General chart, 2,149 [2,548].

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Dangers.—Northward of Zuid reef dangers extend eastward of Lima islands. Chart, 2,137 [2,550]. Lat. 3° 4′ S. Long. 107° 26¼′ E. Var. 1° 5′ E.

A coral reef, half a mile long in a north and south direction and 2 cables broad, and which dries, is the eastern of these dangers; its north point lies E. by S. ⅜ S., distant 2½ miles from the north point of Betong island. Southward of it there are three patches with from 4 to 5 fathoms water over them, the southern being 2 miles from the reef.

Beacons.—An iron beacon, placed in a depth of 3 feet, and surmounted by a conical topmark, painted black, marks the west edge of the shallow bank, at about one mile north-west of pulo Mendulok.

An iron beacon, surmounted by a ball, painted white, marks a shoal which dries at low water, and lies 3 miles southward of Nado island.

A small reef, with 6 feet water over it, lies about 1⅓ cables south-eastward of the beacon.

The inshore channel, marked by these beacons and buoys, has plenty of water and appears to present no difficulty if the buoyage can be depended on, and in working to the southward, during the south-east monsoon, this channel has the advantage of smooth water, as the wind is said to blow directly off shore, which would be a leading wind.

The dangers in the north end of this channel are mentioned at page 519.

Lima islands consist of a group of small, low islands covered with high trees and surrounded by reefs, between which are narrow passages having depths of from 9 to 22 fathoms. Ross, or Bamijo, the southern-most of these islands, is 42 feet above high water and encircled by a reef to the distance of half a mile in places; the others are, Benolo, 94 feet; Kasenga, 58 feet; Bago, 146 feet; Betong, 170 feet; and Ringet, 158 feet above high water. Lat. 3° 4¾′ S. Long. 107° 21¾′ E.

Dangers.—Karang Tuan, a coral reef, dry at low water, lies three-quarters of a mile S.E. by E. ½ E. distant 6 cables from Ross island.

A reef, with 5 feet water over it, lies N. by E. ⅛ E., distant 1¾ miles from Kasenga island. Eastward of a line joining this reef and Ayer Lanchu lighthouse are many isolated reefs; their position will be best seen by reference to the Admiralty chart, and the neighbourhood should be avoided if possible.

Clearing mark.—Ayer Lanchu lighthouse bearing N. ¼ E. leads westward of the Lima islands, and the shoals northward of them.

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Chart, 2,137 [2,550].
Lat. 3° 0′ S.
Long. 107° 16½′ E.
Var. 1° 5′ E.

Gresik island (Table island), small, low and wooded, forms the western limit of the narrowest part of Stolze channel, the reef extending from Kasenga forming the eastern limit. From its isolated position this island serves as an excellent mark to guide vessels in steering for the narrow part of Stolze channel when approaching it from either direction. It is surrounded by a reef which extends to a distance of 4 cables from its northern point; this reef has depths of from 12 to 15 fathoms close along its edge.

Dangers.—A small coral reef, with 2 fathoms water over it, lies 4 cables south-south-eastward of the south point of the island, and one cable east-north-eastward of this reef are two others, smaller and with 3 fathoms water over them.

A reef, with a depth of 2½ fathoms over it, lies nearly in mid-channel between Gresik island and Auer island; all these reefs are "steep-to."

Auer and Klemar islands are described on page 510.

PULO MENDANAU, lying 8 miles north-eastward of Gresik island, is much the largest of the numerous islands which front the west coast of Belitung. It is about 8 miles in length, the same in breadth, and is for the most part low and wooded; on the west and north-west sides it is hilly.

The coast is generally low, with here and there rocky points; the highest summits are Petaling and Sagoweel; the former, situated nearly in the middle of the island, is 669 feet above high water. Sagoweel is near the west point of the island.

Ayer Lanchu, the west point of the island, is high, blunt, and projects considerably from the island; it is surrounded by a narrow coral reef, with the 5-fathoms contour line close to it.

Lat. 2° 53′ S.
Long. 107° 20¾′ E.

LIGHT.—On Ayer Lanchu or West point a twelve-sided iron tower, 118 feet in height, exhibits, at an elevation of 204 feet above high water, a *white occulting* light with a period of system of *ten seconds*, which shows light for *five seconds* followed by an eclipse of *five seconds* duration, and should be visible in clear weather from a distance of 21 miles. A dwelling of white stone is situated near the lighthouse.

Dangers.—A rock, with less than 3 fathoms water over it, lies one cable S.W. ¼ S.; a coral bank which dries, 3 cables S. by E. ¾ E.; and a small reef, on which the depth is less than 3 fathoms, 3 cables, S.E. ½ S. from the point.

Pulo Ayam (Peling) is an islet lying 2½ miles south-south-eastward of Ayer Lanchu, and about one mile off shore; reefs extend 1½ miles, N.W. by N., and 2 miles south-eastward of the island.

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Nado island lies off the south-east coast of Mendanau, from which it is separated by Nado passage, nearly three-quarters of a mile in breadth. Nado passage seems to be completely barred by rocks, and both northward and southward of its entrance are many outlying dangers. Chart, 2,137 [2,550]. Var. 1° 5′ E.

Hoog island, or pulo Kumbong, about a cable in diameter and 100 feet above high water, in the form of a sugar-loaf, is surrounded by a coral reef, the greater part of which dries, and lies nearly 1½ miles northward of Ayer Lanchu. Lat. 2° 51½′ S. Long. 107° 20¾′ E.

Dangers. — Between Hoog island and the coast reef off pulo Mendanau, there are three detached reefs outside the 5-fathoms contour line, and N.N.E. ⅞ E., distant 2 miles from the island is a reef with 3 fathoms least water over it.

Pulo Batu Dinding lies off the north coast of Mendanau, from which it is separated by Nassi channel. The western side of the island is hilly, and here there is a bay, but it is much encumbered with coral shoals. Half a mile eastward from the north-eastern extreme of the island and lying on a bank extending a mile from it, is a small, round, wooded islet, named Krak or Monjet.

Nassi channel is navigable for small vessels only, owing to its being barred at either end; on the bar the depths are 2 fathoms; within the bar, from 5 to 9 fathoms.

Langgir or Rotterdam island, half a mile in length, is high and rocky, and lies three-quarters of a mile westward of the north-west point of Batu Dinding; it is surrounded by a coral reef which dries in most parts and extends half a mile from the west point, having near its termination Low islet, a wooded rock named by the natives Malang Wankang. Lat. 2° 48¼′ S. Long. 107° 22½′ E.

Hoog island in line with Ayer Lanchu, bearing S. ¼ E, clears the extreme of this reef.

CAUTION.—The whole coast between pulo Mendanau and tanjong Binga, the north-west point of Belitung, is fronted by dangers, and vessels should use caution in approaching it; the outlying dangers only will be described.

Perlak shoal, situated 2 miles north of Hoorn island, consists of three reefs lying in a north-west and south-east direction and covering an extent of about a mile; the southern patch has 1¾ fathoms water over it; the other two have depths of 4½, and 2½ fathoms respectively. Chart, 3,597 [3,635]. Var. 1° 5′ E.

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Chart, 3,597 [3,635]. Var. 1° 5′ E.

Three reefs lie between Perlak shoal and Batu Dinding: the eastern, with 3¼ fathoms water over it, is situated with Krak islet bearing W. by S., distant 2$\frac{4}{10}$ miles; the two western reefs lie in a direction W. by S., distant one mile from the preceding.

Lat. 2° 46¾′ S. Long. 107° 32½′ E.

Kelmanbang, a small island lying 6½ miles, E. ½ N., from the north-east point of Batu Dinding, is wooded, and has some cocoa-nut palms on its south and east sides; on its west side is a small hill, and it is surrounded by a reef.

Chart, 2,137 [2,550].

Pulo Tikus, a small rocky island, about half a cable in diameter, situated 4 miles to the southward of Kelambang island, lies on the north-west side of a large coral reef which dries; a bank, with some reefs on it, extends 2 miles south-south-westward of the island. The southernmost of these reefs has on it two rocks dry at low water, which lie S. ⅜ W., distant 1½ miles from pulo Tikus. A low islet, covered with cocoa-nut palms, lies E. by S., distant 1¼ miles from pulo Tikus.

Chart, 3,597 [3,635].

Jumangin shoal, a small coral shoal with one fathom water over it, is situated 4 cables westward of Kelmanbang; on the west side of the shoal there is a reef with 3½ fathoms water over it and depths of 8 fathoms immediately around, which lies with the summit of Kelmanbang island bearing E. by N. ⅝ N., distant 8½ cables and pulo Tikus S. ⅞ E.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, is moored in 6 fathoms water westward of the latter reef.

Batu Pinang lies about 7 cables off the southern side of pulo Kelmanbang with its outer edge south of the west end of that islet, and a detached reef at 4 cables west of the extreme.

Batu Tuku, a large reef, situated about one mile northward of Kelmanbang island, is one mile in length in a north-east and south-west direction and 7 cables in breadth; the greater portion of it dries at low water.

A reef, with 2½ fathoms water over it, lies about three-quarters of a mile westward of Batu Tuku, with Kalmoa beacon bearing E. by N. distant 6 miles and pulo Tikus S. by E.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, marks the western side of the reef. This buoy, with that moored westward of Jumangin shoal, mark the eastern side of the northern entrance of the inner channel, *see* page 516.

Directions.—Coming from the southward and intending to pass through the Inner channel, steer to pass about half a mile westward of Teree reef (Beacon, page 516), and bring the south point of Mendulok

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island to bear N.E. ½ N., which will lead over the deepest part of the narrow ridge in a depth of about 5 fathoms. Chart, 2,137 [2,550]. Var. 1° 5′ E.

When the ridge is crossed steer N. ½ E., and the white beacon on the port, and black beacon on the starboard, hand should soon be seen, and having passed the latter, alter course to N. by E. ¾ E. along the east side of Sikindang, and steer to pass midway between Sebongkok island and pulo Tikus, observing that, to clear the reefs to the southward of the latter island, it should not be brought to bear northward of N. by E. ¾ E. after the south point of Sebongkok island bears West.

The north-east point of Sebongkok island in line with the north-east point of Hoorn island, bearing about S. ¼ E., leads between Jumangin and Perlak shoals.

CHERUCHUP BAY lies northward of pulo Kelmanbang and Batu Tuku, between the latter and Karang Baka; the coast of the bay is flat and wooded. Cheruchup river falls into the eastern part of the bay; Pajung hill, 202 feet above high water, is situated about 2 miles eastward of the entrance. Chart, 3,537 [3,635]. Lat. 2° 45½′ S. Long. 107° 39½′ E.

The coast reef, the greatest portion of which dries, stretches out for about 3¼ miles from the south entrance point.

Settlement.—The fort lies on the north bank of the river, at one mile within the entrance, with the town of Tanjong Pandan close northward of it, which has a population of about 6,000.

Communication.—A steamer of the Netherlands Royal Packet Company running between Batavia and Pontianak calls every four weeks, and the fortnightly steamer between Batavia and Singapore touches here. There is a submarine telegraph cable to Pankal Pinang and one to Pontianak.

Coal and supplies.—There is a Dutch coal depôt on Kalmoa islet, whence small supplies may be obtained. The water, which is brought from a little way up the Cheruchup river, is very good; it may be procured also on the right bank of the river, near the entrance, but it is not so good.

Trade.—The principal exports are mats, rattens, damar, wax, turtles, sharkfins, deer horns, pepper, tapioca, &c., and imports rice, salt, oil, tobacco, wine, beer, &c.

Kalmoa islet, 150 feet above high water, and wooded, lies on the south side of the channel between the reefs, and one mile from the northern entrance point of the river. Lat. 2° 45′ N. Long. 107° 36½′ E.

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Chart, 3,597 [3,635]. Var. 1° 5′ E.

Beacon.—On the north side of the islet stands a white pyramidal beacon, 72 feet in height, visible from a distance of about 12 miles in clear weather.

Dangers.—Stavoren, a small coral reef, half a cable in extent, with a least depth of 2 fathoms over it, lies with Kalmoa islet bearing E. $\frac{1}{4}$ S., distant $6\frac{1}{2}$ miles, and is the western danger in the approach to Cheruchup bay.

A reef, with 4 fathoms water over it and 11 fathoms around, lies about two-thirds of a mile northward of Batu Tuku.

Lat. 2° 43¼′ S. Long. 107° 38¼′ E.

Karang Tenga, north-north-eastward of Batu Tuku, is about $1\frac{1}{2}$ cables in diameter, with a least depth of 3 fathoms over it and 9 to 10 fathoms water around; from it Kalmoa island bears E.S.E., distant $3\frac{2}{3}$ miles. Westward of the point of the shore reef, on the south side of the entrance to Cheruchup river, are three small coral reefs, the two northern having depths over them of 3 fathoms, and the southern $2\frac{1}{2}$ fathoms.

Karang Mangkok Besar, which lies with Kalmoa islet bearing S.E. by E., distant nearly 3 miles, has 4 fathoms over it; close northward lies a small reef with 3 fathoms water over it, and half a mile to the eastward of it is a reef on which the depth is 2 fathoms. Between these and the land there are numerous shallow heads.

Karang Baka, on the north side of the bay, is a quarter of a mile in length in a north and south direction, and has a depth of one fathom water over it, with 6 fathoms close-to; from it Kalmoa islet bears S.E. $\frac{3}{8}$ E., and the hill on Kelmanbang island S. by W. $\frac{3}{8}$ W.

A coral reef, with a depth of $2\frac{1}{4}$ fathoms over it, is situated about 8 cables westward of Karang Baka, with Kalmoa beacon bearing S.E. by E., distant 5 miles and Kelmanbang summit S. $\frac{5}{8}$ W.

A small coral patch, with $4\frac{1}{2}$ fathoms water over it, lies midway between the above reef and Karang Baka.

A patch with 7 feet water over it, lies half a mile north-east of Karang Baka, and there are several shallow patches between it and the shore.

LIGHT BUOYS.—The north extreme of Karang Tenga is marked by a buoy exhibiting a *white occulting* light with a period of system of *thirty seconds*, showing light for *ten seconds* followed by an eclipse of *twenty seconds* duration; in clear weather the light should be seen from a distance of 6 miles.

A buoy is moored north-westward of the extreme of the spit on the western side of the entrance to the river, and exhibits a *white occulting* light with a period of system of *thirty seconds* showing light for *ten*

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seconds, followed by an eclipse of *twenty seconds* duration; in clear weather the light should be seen from a distance of 6 miles. Chart, 3,597 [3,635]. Var. 1° 5′ E.

Buoys.—A can buoy, painted black, and surmounted by a truncated cone, marks the west side of the 2¼ fathoms reef westward of Karang Baka. Lat. 2° 42′ S. Long. 107° 38′ E.

A can buoy, painted black, and surmounted by a truncated cone, is moored on the south-west edge of Karang Mangkok Besar.

River beacons.—The southern side of the channel into the river is marked by eleven stake beacons, each surmounted by a white ball.

On the northern side by one stake beacon, surmounted by two truncated cones, and eleven stake beacons, each surmounted by a truncated cone.

CAUTION.—No dependence should be placed on the existence or position of either beacons or buoys.

Anchorage.—The best anchorage is with Kalmoa island bearing S.E. by E. ¾ E., and the west extreme of Kelmanbang island S.W. ¾ S., in depths of 6 or 7 fathoms, over sand. Vessels, however, can anchor westward of all the buoys in 11 to 13 fathoms water about 5 miles from Kalmoa islet.

Cheruchup bay affords no safe anchorage in the north-west monsoon, and even during the north-east monsoon there are occasional heavy gales from the north-west. It is advisable to moor, as variable streams in the anchorage are liable to cause a foul anchor.

Directions.—To enter this bay, having passed Ayer Lanchu, the west point of Mendanau at a distance of 2 miles, steer N. by E. till Rotterdam island bears S.S.E., then steer E.N.E. till Kalmoa island bears S.E. by E. ½ E.; thence direct for that island until the west extreme of Kelmanbang bears S.W. ¾ S., and anchor in about 7 fathoms water.

When near the north-west point of Batu Dinding island, during the south-west monsoon, the wind will sometimes shift to the eastward; in which case, if bound to this bay, it is better in a sailing vessel to anchor and wait for the sea breeze from the southward or south-westward, as the current runs to the north-west with an easterly wind.

Tanjong Binga, a high bluff point, forming the north-western extreme of Belitung island, may be recognised by the hills which are near it, the easternmost being Buling hill, 2 miles from the point; from tanjong Binga the coast trends north-eastward, the village of the same Lat. 2° 36½′ S. Long. 107° 37¼′ E.

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Chart, 3,597 [3,635]. Var. 1° 5′ E.

name being close northward of it. This part of the coast is low, and near the point the shore reef extends off for a distance of $1\frac{1}{3}$ miles.

Lat. 2° 39½′ S. Long. 107° 32¼′ E.

Sri Blitong rock, with a depth of 2 fathoms over it, is situated with Kalmoa beacon bearing S.E. $\frac{3}{4}$ S., distant $6\frac{7}{10}$ miles, and Buling hill, N.E. by E. $\frac{7}{8}$ E.

Argo shoals consist of a number of coral reefs, about $1\frac{1}{2}$ miles in length in a north and south direction, and one mile in breadth.

On the largest of these reefs, situated in the centre, there is a depth of 2 feet; on the northern and south-western $3\frac{3}{4}$ fathoms, and on the western, from which Gunong Tobalo bears E. $\frac{1}{8}$ S., and Lutung island N.E. $\frac{1}{8}$ N., $2\frac{1}{4}$ fathoms.

One mile southward of the south-western reef is another, with one fathom water over it.

Several other patches exist in the neighbourhood of Argo shoals, for which, *see* the Admiralty chart.

ELEVEN ISLANDS are a cluster of small islands lying off the north-western extreme of Belitung. The names of the most important are Lutung, Babi (Bambu), Semajo (Sampit), and Kepajang (Burong); the latter is the largest of the group, and lies 3 miles north-eastward of tanjong Binga, at nearly one mile off shore.

Langkuas (North-west) island, the north-westernmost of the Eleven islands, is 2 cables in length in an east-north-east and west-south-west direction and one cable in breadth; it lies $2\frac{1}{2}$ miles off shore, and is surrounded by a coral reef which extends 2 cables from its south-west point, the north-west side being "steep to" with the 5-fathoms contour line passing close to it.

For the description of the coast eastward of the Eleven islands, *see* page 552.

Lat. 2° 32½′ S. Long. 107° 37¼′ E.

LIGHT.—Near the east end of Langkuas island a sixteen-sided iron tower, 215 feet in height, exhibits, at an elevation of 200 feet above high water, a *white fixed and flashing* light with a period of system of *two minutes* which shows light for *sixty seconds*, is eclipsed *twenty-five seconds*, *flash* for *ten seconds*, and eclipsed *twenty-five seconds*. It should be visible, in clear weather, between the bearings of N. 2° E. and S. 86° W. (except where obscured by islands) and from a distance of 20 miles.

Kembung, an islet consisting of some brown stones piled one on another, is one mile southward of Langkuas and surrounded by a coral reef.

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Malang Kechil, a smooth, white, shining rock above water, 4 cables westward of Kembung, is surrounded by a coral reef, which extends a cable south-south-westward of it, and one cable northward there is a rock which dries at low water. Chart, 3,597 [3,635]. Lat. 2° 33¼′ S. Long. 107° 37¾′ E. Var. 1° 5′ E.

About one mile south-south-westward of Malang Kechil there are four reefs having depths of from 4 feet to 4½ fathoms over them; from the 4 feet patch Malang Kechil bears N.N.E. ⅛ E., and the north point of Babi island E. ¾ N.

Clearing marks.—The rocks off the south-east point of Langkuas island in line with Malang Kechil, bearing about N.E. ⅝ N., clears these latter dangers, passing 2 cables westward of them.

Anchorage.—There is good anchorage 3 cables to the southward of Langkuas island in from 9 to 10 fathoms water, over sand; this anchorage may be approached from the south-westward by steering for the highest part of Kepajang island, bearing East, which leads between the coast reef of Langkuas island and the rock northward of Malang Kechil.

Alwina reef, about a cable in diameter and with a depth of 3 fathoms over it, and 15 to 16 fathoms close-to, lies with Langkuas lighthouse bearing S.S.W., distant 1⅛ miles. Lat. 2° 31′ S. Long. 107° 37½′ E.

A patch, with 5 fathoms least water over it, lies three-quarters of a mile E. by S. ⅔ E. from Alwina shoal and N.E. ½ E., 1 6/10 miles from the lighthouse.

STOLZE CHANNEL.—Depths.—Towards the outer shoals on the western side of the entrance to Stolze channel, approaching from the southward, the depths are much less than those on the eastern side, and they decrease more regularly, the 10-fathoms contour line extending some 5 or 6 miles to the eastward of them, so that they may be approached by proper attention to the lead. Near the Shoal-water group, however, the 10-fathoms contour line extends a little more than half a mile to the eastward of the shoals, and consequently those dangers must be approached with greater caution. Chart, 2,137 [2,550].

Depths of 9 to 10 fathoms will be found on the bank extending about 3 miles eastward and south-eastward of Vansittart shoals.

Between White rock and Gresik island, in Stolze channel, the depths are greater on the eastern side, and shoaler on the western side, than in the fairway.

A bank, with 7 to 11 fathoms water over it, extends 2 miles south-south-eastward from Auer island.

The bottom through the entire length of Stolze channel appears to be composed principally of sand and broken shells, with here and there broken

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

coral. North-westward of Belitung island the bottom is mostly soft black mud, with sand, broken coral, and shells in places.

Anchorages.—The following anchorages are near, or in, Stolze channel:—

On the eastern end side of the bank, southward of Shoal-water island, in from 8 to 9 fathoms water, over sand and clay, by not bringing the island to bear eastward of North.

Near Teree reef, with Betung island bearing between N. by W. ½ W. and N. by W. ¾ W., in depths of from 8 to 10 fathoms; also southward of that island in from 8 to 10 fathoms with its east point bearing North, and Ross island N.W. by W. ½ W.

To the westward of the dangers along the south-west side of pulo Mendanau there are depths of from 10 to 13 fathoms, over mud, with Ayer Lanchu between the bearings of North and N. by W., and between the south point of pulo Mendanau bearing East, and pulo Ayam E. by S. ½ S.

N.E. by N., distant one mile from Hoog island, in 8 fathoms water, over hard sand; also inside the island in depths of from 11 to 12 fathoms.

On the western side of the strait there is good anchorage, in 11 fathoms water, southward of Gresik island; with the south point of Auer island, W.N.W., and the east point of Gresik island N. ½ W.

Near the north-east point of Auer island, in 9 fathoms water, over sand, with the west point of Klemar, N.W. by W., and the east point of Auer S. ¾ E.

Lat. 3° 9¾′ S. Long. 107° 41′ E.

Directions.—From the southward.—As soon as Gunong Beluru (Blantu), the highest hill on the south-west coast of Belitung, can be recognised, it should be brought to bear about N. by E.; and with it just in sight on that bearing, if the weather be clear, a vessel will be about 33 or 35 miles distant from it, and in the fairway, with Carnbee rocks about 13 miles to the north-eastward, and may shape a course for Stolze channel.

As the vessel proceeds to the northward, Luda hill will come in sight, and shortly afterwards Pyramid and South peak, all of which will be seen to the eastward of Gunong Bagenda. Gunong Beluru will soon be visible, at first a little to the left of Beluru, and by the time they are in line with it, Gunong Bolo, on the south extreme of pulo Selio, will be well in sight, distant about 15 miles. Shoal-water island lighthouse will also be in sight.

When abreast of White rock, Auer island will be nearly ahead, and Kalangbue on the port bow; the Lima islands will soon be made out on the starboard bow, and as they are approached Gresik island will be seen ahead.

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Gresik island should be approached on a N.N.W. bearing until Ayer Lanchu lighthouse bears N. by E., which will lead between Gresik island and the reefs extending northward of the Lima islands. When the north side of Auer island opens northward of Gresik, bearing about W. ½ N., steer direct for Gaspar island, between Hewitt and Akbar shoals; or vessels can pass between Akbar shoal and the coast of Belitung. *Continued on page 539.*

Chart, 2,137 [2,550]. Var. 1° 5′ E.

Working through. — From the southward, standing to the eastward, towards Carnbee rocks, Gunong Beluru must not be brought northward of N. by E.; and to clear Naga reef, Anvang bank, and Cooper shoal, Gunong Bolo must not be brought westward of N. by W. Near Three-feet shoals, Gunong Bolo must be kept eastward of N. by E.

Lat. 3° 34½′ S. Long. 107° 41′ E.

The dangers southward of pulo Selio should not be approached under a depth of 20 fathoms, or White rock brought to the westward of N. by W.; and when Gunong Bolo bears eastward of N.E. ½ E., White rock must be kept to the eastward of North, to avoid the edge of the bank which lies south-eastward from it.

White rock should not be approached nearer than one mile, nor to a less depth than 14 fathoms; when northward of White rock it must not be brought anything southward of E.S.E. until the north point of pulo Selio bears E. by N. ½ N., to clear Tiga rock. Njela bank should not be approached under a depth of 10 fathoms, or White rock brought southward of S.E. by S.

Gunong Bolo kept eastward of S.E. by E. will lead southward of Njela bank, and south-westward of the foul ground between it and the Lima islands. Kasenga island, bearing N. ¼ E., leads westward of the dangers extending from Ross island; and Ayer Lanchu lighthouse bearing eastward of N. ¼ E. will lead westward of the rocks which extend from Kasenga, and also westward of all dangers northward of the Lima islands. When Gresik island bears West, a vessel will be northward of the reef extending from Kasenga, and may stand eastward until the lighthouse bears N. ½ W.

Abreast of pulo Ayam, Ayer Lanchu lighthouse must not be brought to the westward of N. ¼ E. To clear the reef surrounding Hoog island, the lighthouse should not be brought to the southward of S.S.E. until Langgir island bears N.E.; Hoog island, in line with the lighthouse, bearing S. ⅜ E., leads westward of the dangers extending from Langgir island.

The dangerous coast of Belitung, between Mendanau and Langkuas lighthouse, should not be approached under a distance of 6 miles, unless bound to Cheruchup bay.

Standing to the westward, Shoal-water island, if not brought to bear eastward of North, will lead eastward of all the shoals southward of it, and the lead will also give good warning when standing towards them,

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Chart, 2,137 [2,550]. Var. 1° 5′ E.

as they lie some 4 or 5 miles within the edge of the 10-fathoms line. Shoal-water and Hancock islands must be approached with caution, as the lead does not give much warning when nearing their ledges; they should on no account be approached within a distance of 2½ miles. Hancock island bearing S. ¼ W. leads eastward of Bliss shoal, between which and Auer island a vessel may stand to the westward until the summit of that island bears N.N.E., which will lead eastward of Vansittart shoals.

Kalangbue island bearing W. ½ S. leads southward of the dangers extending from Auer and Gresik islands. The east side of Gresik island may be approached to a distance of one mile; but the east side of Klemar island has a rock lying one mile off, which will be avoided if Gresik island is not brought eastward of S. by E. ¾ E. The summit of Auer island, in line with the east extreme of Klemar island, bearing S. ⅛ E., leads 1½ miles eastward of Hewitt shoal. *Continued on* page 539.

Coming from the northward, the preceding directions should be reversed.

By night.—Having made Shoal-water island light steer to pass about 6 miles eastward of it, and when Ayer Lanchu light is sighted steer for it bearing N. by E., which will lead, in not less than 20 fathoms water, to within 2 miles of that point, and a N.W. course may then be shaped to pass between Berikat point and Boompjes island, or a N.N.W. ½ W. course for the eastern side of Gaspar island, observing that Ayer Lanchu light should bear nothing to the southward of S.S.E. ½ E. to avoid Akbar shoal.

NORTH-EAST COAST OF BANKA. — The mariner cannot be too cautious in approaching this coast, and must use every precaution not to get entangled among the outlying dangers when running for Gaspar strait in thick weather.

Chart, 2,149 [2,548]. Lat. 2° 36¼′ S. Long. 106° 42′ E.

Aspect.—Of the many hills on the north-east coast of Banka the principal are, the Saddles, 912 feet above high water, situated about 10 miles westward of Berikat point; the Pading mountains, the summit of which is elevated 1,677 feet at 10 miles westward of the Saddles; and the double-peaked mountain, Gunong Maras (Crown peak), 2,300 feet above high water, at about 20 miles within the north coast of the island.

Coast.—The coast from Berikat point trends 25 miles in a westerly direction to Langka point, and is steep in places with rocks from 30 to 40 feet above high water; in other parts there are sandy beaches; near Langka point, and the rocky parts eastward of it, there are rocks above and below water. About 16 miles north-westward from Langka point is Kerow village, whence the coast trends in a northerly direction for 4 miles to

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Lempuyang rocky point and north-north-west for the same distance to Selinta, a high rocky point formed by a spur of the Lapa mountains, and surrounded by rocks above and below water. Chart, 2,149 [2,548]. Var. 1° 5′ E.

Dangers.—Timor, the eastern outlying danger on this coast, is 7 miles eastward of Langka point, consists of coral on its northern side, and is one mile in length in a north-east and south-west direction, and 7 cables in breadth, the whole of which dries at low water; on the southern portion there is a bank that is always above water. Lat. 2° 28¼′ S. Long. 106° 34′ E.

Perlang, a bank which dries at low water, is 1¼ miles in length and 6 cables in breadth, and composed of coral on the north side, but on the western side, N.E. by E. from Langka point, has a bank which is always above water.

Between Timor and Perlang there are two patches with 1½ and 2½ fathoms water over them respectively, situated 3 miles from the coast.

Barat rock, lying 2 miles northward of Langka point, is 7 cables in length, 3 cables in breadth, and dries at low water. The 5-fathoms contour line passes close to the northward of the two patches, westward of Timor, and of Perlang and Barat rock. Berikat point, bearing nothing to the eastward of E.S.E., clears all these dangers, passing to the northward. Chart 2,597 [2,551]. Lat. 2° 26′ S. Long. 106° 28′ E.

Koba road, 3 miles north-westward of Langka point, is altogether open to northerly winds, but affords anchorage during the easterly monsoon; the road is clear of danger outside the 3-fathoms contour line, which is from 2½ to 3 miles from the shore. Inside this lie some reefs which dry at low water; Guntreng reef and Pinyak rocks being situated off villages of the same name.

Anchorage.—A good anchorage is in 3½ fathoms water, over mud, with pulo Buar bearing N. by E. ⅓ E., and Langka point S.E. by E. ⅓ E.

ISLETS AND REEFS.—Tetawi bank. — Fronting the coast between Kerow village and Sungi Marawang is a chain of banks from one mile to 5 miles in breadth, known under the general appellation of Tetawi bank, upon which are several scattered islands. Many patches on these banks dry at low water.

Pulo Buar, the south-eastern of the islets, is composed of sand, covered with shrubs and high trees, and lies 11 miles northward of Langka point; it lies on a drying coral reef, which extends to a distance of one mile southward of it. Many rocky patches lie westward of the islet. Lat. 2° 16¾′ S. Long. 106° 28′ E.

Horse rocks consist of two reefs, lying 2 cables apart in a W. by N. and E. by S. direction, with depths of 2 to 6 feet over them and 7 to 10 fathoms around; from the western pulo Buar bears W. by N. ⅛ N., distant 2 miles.

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Chart, 2,597 [2,551]. Var. 1° 5′ E.

Beacon.—The western side of the Horse reefs is marked by a beacon, painted black, and surmounted by a truncated cone.

Chart, 2,137 [2,550]. Lat. 2° 16½′ S. Long. 106° 31¼′ E.

Elisabeth reef, with 1½ fathoms water over it, lies N.E. by E. ⅔ E., distant 2¼ miles of the westernmost Horse rock, with pulo Buar bearing W. ½ S., distant 4½ miles; it is circular, about 4 cables in diameter, and has depths of from 9 to 12 fathoms round it.

Chart, 2,597 [2,551].

Mentawa reef consists of two coral reefs which dry at low water and lie 8 cables north-eastward of the north-east side of the reef extending from pulo Buar.

A small coral reef, about a quarter of a cable in diameter, lies with the north-west point of pulo Buar bearing S.W. ⅛ W.; it is "steep-to," has a least depth of 3 fathoms over it, and is surrounded by depths of 7 to 8 fathoms.

A coral patch, with a depth of about 3½ fathoms over it, lies E. by N. ¾ N., distant 8¼ miles from pulo Buar.

Goat shoal, "steep-to," with one fathom water over it, is 4 cables in length in a north-north-east and south-south-west direction, and surrounded by depths of 10 to 11 fathoms; it lies 5¼ miles, N.N.E. ¼ E., of pulo Buar.

Buoy.—Goat shoal is marked on its western side by a conical buoy, painted black, and surmounted by a staff and ball.

Lat. 2° 15′ S. Long. 106° 26′ E.

Ketugar, a sand bank above water, is half a mile in length in a north and south direction and 3 cables in breadth, and lies N.W. ¼ N., distant 2½ miles from pulo Buar.

A small bank, about 2 cables in diameter with 2½ fathoms water over it and depths of 9 fathoms around, lies E.N.E., distant 1½ miles from Ketugar.

Gosong Asam, an extensive reef, about 4½ miles in length in an east and west direction and about 1½ miles in breadth, lies about 2 miles north-westward of pulo Buar, and has on it two patches overgrown with vegetation which have the appearance of islets.

Pasir, the eastern, overgrown with brushwood, is W.N.W., distant 4 miles, and Johora, the western, on which are cocoa-nut palms, W. by N., distant 6 miles, from pulo Buar.

Northward of the north-east end of Gosong Asam, a coral reef $1\frac{3}{10}$ miles in length, in a north-west and south-east direction, has on it a small bank which dries at low water, and one mile eastward of this reef there is a small shoal with 3½ fathoms water over it.

Tetawi, an islet, with mangroves and cocoa-nut palms on it, situated on a reef, which dries, about 1¼ miles in diameter, lies W. ½ N., distant 7 miles, from pulo Buar.

General chart, 2,149 [2,548].

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Tealí, a coral reef which dries, lies N.W. ¼ W., distant 2 miles from Tetawi, and between these there is another drying reef. Chart, 2,597 [2,551]. Var. 1° 5′ E.

Beacon.—The western side of Teali reef is marked by a beacon, painted black and surmounted by a truncated cone.

Karang Keranji or George reefs, situated within the 5-fathoms contour line north-north-eastward of Lempuyang point, dry at low water.

Inshore channel. — Between Tetawi island and Teali on the east and Karang Keranji off the Banka shore is a passage with from 3 to 4 fathoms water, used by small vessels trading between Koba village and Sungi Marawang.

Pulo Panjang, the largest island off this coast, is situated about 4 miles N.E. by E. of Selinta point; its shores are composed of sand and mud, it is covered with cocoa-nut palms, and a coral reef extending from 5 to 8 cables off surrounds it. Lat. 2° 9′ S. Long. 106° 17′ E.

A rock, with 4 feet water over it, lies one mile, S.W. ⅛ W., from the south-west side of the island; and another, which dries at low water, is situated 6 cables northward of the north-east point of the reef.

Pulo Bojur, about one mile eastward of pulo Panjang, within the 5-fathoms contour line, is smaller, and also covered with cocoa-nut palms; except on the south-west side, a coral reef, which dries, extends from it, being $1\frac{3}{10}$ miles off in a north-east direction. A bank, with from one foot to 3 feet water over it, stretches out southward of it, and 1½ miles southward of the island there is a reef with a depth of 3 feet over it. A coral reef, one mile in length in a north and south direction and 3 cables in breadth, which dries, lies S.E. ½ E. distant 2½ miles and detached reefs lie north-east and south-east, distant about 3 miles from pulo Bojur.

Gosong is the western of two coral reefs which lie west-north-westward of pulo Panjang, from which it is distant 2½ miles; between it and Gerek, the eastern of these reefs, there are depths of from 4 to 5 fathoms, and both have banks near the centre which dry.

Beacon.—The western side of Gosong is marked by a beacon, painted black, and surmounted by a truncated cone.

Karang Kapal, lying inside the 3-fathoms contour line, about 5 miles eastward of the mouth of the Sungi Marawang, is a coral reef on which the depth is 2 fathoms; about 3 cables north-east, and 7 cables east-north-east of it lie two reefs with 1¼ and 1½ fathoms water over them respectively. The latter reef lies with the east points of pulo Panjang and Tetawi in line, bearing S.S.E. ⅛ E. Three patches with depths of 4¾ to 5 fathoms over them lie in a N.E. by N. direction from Karang Kapal, the outer being 4 miles distant from it.

A number of reefs, most of which dry, are situated northward of the entrance to Sungi Marawang; from the eastern point of the southward

General chart, 2,149 [2,548].

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Chart, 2,597 [2,551]. Var. 1° 5′ E.

of these reefs, the northern entrance point of that river bears S.W. ½ W. and tanjong Raja N. by W. ⅜ W. In the centre of this reef there is a bank which dries at low water.

Sullivan rocks, with 1¼ fathoms least water over them, are situated S.S.E. ¾ E., distant 8¼ miles from tanjong Raja.

Malan Tate (Black rock reef), circular in form and half a mile in diameter, lies on the extreme of the coast reef, immediately inside the 5-fathoms contour line, and 4 miles from the shore; some rocks on it, 14 feet above high water, may be seen from a distance of 5 miles, and lie S.E. ⅝ S., distant 2 miles from tanjong Raja.

Fokke reef, 4 cables in length and 3 in breadth, with 1¼ fathoms water over it, lies about N.E. ⅝ N., distant half a mile from Malan Tate; near the reef there are depths of from 5 to 6 fathoms.

Lat. 2° 6½′ S. Long. 106° 24½′ E.

OFF-LYING REEFS.—Fathool Barie shoal, composed of coral and half a mile in length in a north and south direction, is the southernmost of several patches which are "steep-to," lying from 15 to 23 miles off shore; it has a depth of 6 feet over it, and lies with pulo Panjang bearing W. by S. ⅞ S., distant 7¾ miles.

Diederika shoal, circular in form and 3 cables in diameter, has a depth of 2 feet over it and 8 to 10 fathoms around; it lies 2¼ miles north-north-eastward of Fathool Barie shoal, with Bojur island bearing S.W. ⅞ W.

West Hydrograaf rock, the northernmost of this group, is 33 yards in extent, "steep-to," and has a least depth of 1¾ fathoms over it, with 9 to 13 fathoms around. It lies with Gunong Raja bearing W. ⅝ N., distant 14½ miles.

Palmer reefs consist of two small and steep coral reefs lying in an east-south-east and west-north-west direction and half a mile apart; over the western there is a depth of 7 and over the eastern 9 feet; they are both about 2 cables in diameter and have depths of from 10 to 13 fathoms around. They lie 3 miles south-westward of Hydrograaf rock, and, from the western, Gunong Raja bears W. by N. ½ N., distant 12 miles.

Chart 2,137 [2,550]. Lat. 2° 1′ S. Long. 106° 33′ E.

East Hydrograaf reef, the easternmost of this group, is 2 cables in length in a north-west and south-east direction, composed of coral and with one foot least water over it; it is "steep-to," having depths of from 14 to 15 fathoms around, and lies with Gunong Mangkol bearing S.W. by W. ½ W., and Gunong Raja W. by N. ½ N.

Keuchenius reef, about 3 cables in diameter and with 4¼ fathoms water over it, and 15 to 16 around, lies with Gunong Mangkol bearing W.S.W. and the Saddles S. ⅝ E.

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Noordziek shoal, about 2 cables in extent, in a north and south direction, "steep to," with a rock which dries at low water, and 10 to 14 fathoms around, lies about 1½ miles south west of East Hydrograaf reef. Chart, 2,137 [2,550]. Var. 1° 5′ E.

Smit van den Brucks reef, about one cable in diameter, with 2 fathoms water over it and 10 to 12 fathoms around, lies 2 miles south of Noordziek shoal with Gunong Raja, bearing N.W. by W. ⅔ W.

Robert's rock, a coral reef 4 cables in length in a N. by W. and S. by E. direction and 2 cables in breadth, is just awash and "steep-to," having 9 to 10 fathoms around; it lies with Gunong Raja bearing N.W. by W., and Bojur island S. by W. ⅝ W. Chart, 2,597 [2,551]. Lat. 2° 1¼′ S. Long. 106° 21½′ E.

General Elliot reef, composed of coral and "steep-to," is 4 cables in length in a north-north-west and south-south-east direction and 2 cables in breadth; it has a least depth of 3 feet, with 7 to 8 fathoms around, and lies with Gunong Sambongiri bearing N.W. by W. ⅔ W. and Bojur island S. ⅞ W.

A small coral bank, with a rock on it which dries at low water, is situated S.S.W. ⅓ W., distant one mile from, and a reef, with 13 feet water over it, about half a mile north-eastward of, General Elliot reef.

Beacon.—The southern side of General Elliot reef is marked by a beacon, painted black, and surmounted by a truncated cone.

Tanjong Raja, situated 11 miles northward of Sungi Marawang, is a cliffy point distinguished by two hills; extensive reefs project off its south-east and south sides, which make it necessary to give it a berth of about 8 miles. Lat. 1° 54′ S. Long. 106° 11¾′ E.

Tate rocks, 14 feet above high water, lie 5½ miles south-eastward of tanjong Raja; pulo Panjang, bearing westward of South, leads eastward of Sullivan rocks and the dangers inshore of it.

MARAWANG or Pankal Pinang, the chief town of one of the tin districts, is situated on a branch of Sungi Marawang, about 6 miles above the entrance; the town of Rusa is on the main river about 9 miles from the sea. The bar of the river has from 3 to 4 feet over it at low water, the channel having a N.W. by W. ½ W. direction; in the mouth of the river the depths are from 2 to 3 fathoms. The northern entrance point has a clump of cocoa-nut palms on it.

Supplies.—Good water can be obtained at Pankal Pinang, and medical attendance by application to the Dutch official in command.

Anchorage. — Marawang road affords anchorage in a depth of 3½ fathoms, over mud, with the northern entrance point bearing West and and the east point of pulo Tanjang S.E., and about 4 miles off the entrance

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Charts, 2,597 [2,551]; 2,149 [2,548]. Var. 1° 5′ E.

to Sungi Marawang; caution is necessary when approaching it on account of the surrounding dangers.

Directions.—Vessels bound from Gaspar strait to Marawang road having rounded Berikat point and intending to pass westward of Goat shoal and General Elliot reef, may steer about N.W. $\frac{5}{8}$ W. for Gunong Betong (flat topped) to pass eastward of Elizabeth reef; the buoy on Goat shoal and the beacon on General Elliot reef should be left on the starboard hand, passing eastward of the drying reef, south-south-westward of General Elliot reef, and when the north-western hill of the Lapa mountains bears S.W. $\frac{3}{8}$ W., steer for the anchorage.

Or, if taking the inshore channel, steer for Gunong Mangkol, bearing W. by N. $\frac{1}{2}$ N., to pass southward of Buar and Tetawi islets, till Tetawi bears North, when alter course to N.W. $\frac{1}{2}$ N. for tanjong Bunga. With pulo Panjang bearing North, steer N.N.W. $\frac{1}{2}$ W. for Gunong Betong, passing westward of the beacons on Teali and Gosong reefs, and when the north points of Bojur and Panjang islands are in line, bearing about E. by S. $\frac{1}{4}$ S. the anchorage may be steered for.

When approaching from the northward, pass about 6 miles eastward of tanjong Raja, in depths of from 10 to 11 fathoms, and bring pulo Panjang to bear S. $\frac{1}{2}$ W., keeping it on that bearing until Sharp peak, the north western peak of the Lapa mountains, bears S.W. $\frac{3}{8}$ W.; then steer direct for it, until pulo Tetawi is just open westward of pulo Panjang, bearing S.S.E. $\frac{7}{8}$ E. and anchor in 4 fathoms water, with the mouth of Sungi Marawang bearing West.

Chart, 2,597 [2,551].

LIAT BAY, formed between tanjong Raja and tanjong Laijang, affords good anchorage with shelter from southerly and westerly winds, about three-quarters of a mile off shore; in the easterly monsoon the swell is heavy.

The entrance to the river has a westerly direction between two rocky islets, the northern covered with vegetation; inside these are several rocks which dry at low water.

Lat. 1° 51′ S. Long. 106° 7¼′ E.

Town.—Liat, the chief town of one of the tin districts, stands a short distance up the river of the same name.

Landing may be effected about 2 cables southward of the river mouth, and here there is a road to Liat.

Water.—Fresh water is difficult to procure here, on account of the rocks in the mouth of the river, which can only be passed at high water, and even then there is at times a heavy surf on them, which makes the entrance dangerous for boats. Wood and spars of any dimensions may easily be obtained on the south side of the bay, within half a mile of the shore.

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Karang Pedis Selatan, about a cable in length in a north-west and south-east direction, and 40 yards in breadth, with a least depth of 11 feet over it, lies with Gunong Raja bearing West, distant $3\frac{1}{2}$ miles. Chart, 2,597 [2,551]. Var. 1° 5′ E.

Karang Pedis Utara, about 50 yards in diameter and with 16 feet water over it, lies with Gunong Raja bearing W. by S. $\frac{5}{8}$ S., distant $5\frac{1}{4}$ miles.

Circe reef, 2 cables in length in a north and south direction, and with $2\frac{1}{4}$ fathoms water over it, and depths of less than 5 fathoms, extending for a distance of 2 cables northward of it, lies $2\frac{1}{2}$ miles south-eastward of Liat rocks, with Gunong Raja bearing S.W. $\frac{3}{4}$ S. distant $4\frac{1}{3}$ miles. A patch with $3\frac{1}{4}$ fathoms water over it, and surrounded by depths of 7 and 8 fathoms, lies about half a mile N.E. by E. $\frac{1}{2}$ E., and Bronbeek bank, on which the depth is 3 fathoms, about 6 cables N.W. by W. $\frac{3}{4}$ W., of Circe reef.

Between Circe reef and Bronbeek bank and the shore there are patches of from $4\frac{1}{4}$ to $4\frac{3}{4}$ fathoms.

Liat rocks, about 2 cables in length in a north and south direction and one cable in breadth, are two rocks which dry at low water, and lie 3 miles from the shore, with tanjong Raja bearing S. $\frac{1}{2}$ E., and the southern summit of Gunong Maras in line with the northern entrance point of Sungi Liat, W. $\frac{7}{8}$ S. Two banks, with $4\frac{3}{4}$ and 5 fathoms over them, lie one cable and 3 cables south-westward, and another bank on which the depth is 5 fathoms, is situated $1\frac{1}{2}$ miles north-eastward; otherwise close to the rocks there are depths of 6 or 8 fathoms. Lat. 1° 49′ S. Long. 106° 11½′ E.

Banks off tanjong Laijang.—A bank with 3 to 4 fathoms water over it lies one mile N. by E. from tanjong Laijang and N.E. by E. $\frac{3}{8}$ E., distant $1\frac{2}{10}$ and $1\frac{6}{10}$ miles, and E. by N. $\frac{1}{2}$ N. $1\frac{2}{10}$ and $1\frac{7}{10}$ miles from the same point there are four banks, the two northern having depths of $4\frac{1}{4}$ and the two southern 5 fathoms over them respectively.

Anchorage.—The usual anchorage in Liat bay is about $1\frac{1}{4}$ miles from the shore in 4 fathoms water, over mud, with the mouth of Sungi Liat W. by S. $\frac{2}{3}$ S., and tanjong Laijang N.N.W. $\frac{2}{3}$ W.; southward of the river is a fine sandy beach.

Directions.—Approaching Liat bay from the northward, tanjong Laijang should be passed in a depth of about 7 fathoms, which will be found at 2 miles from it. The course is then S.W. towards the anchorage, but when tanjong Laijang bears northward of West, tanjong Raja should not be brought to southward of S. by E. $\frac{1}{2}$ E.

Coming from the eastward, bring tanjong Raja to bear S.W. by W., and steer towards it till tanjong Laijang bears N.W. $\frac{1}{2}$ W., then steer N.W. by W. towards the anchorage.

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Chart, 2,597 [2,551]. Var. 1° 5′ E.

The coast from tanjong Laijang trends northward for 12 miles to Tuing point, a cliffy point with a hill 817 feet above high water, and Pongul islet lying close northward of it. The coast to the southward forms a shallow bay, in which, at 5 miles from Tuing point, is pulo Simbang, a small island connected to the shore by a reef.

There are no known dangers immediately off this coast beyond the distance of 2 miles. Iwan reef, 14 miles eastward of pulo Simbang, is described with the outlying dangers, page 538.

The coast from Tuing point trends north-westward for 10½ miles to tanjong Grasak, the northernmost point of Banka, where it turns sharply to the westward.

Reef.—A reef with 1¼ fathoms water over it lies with tanjong Grasak bearing W. by N. and Paku point S. ½ E.

For coast to the westward, *see* page 550.

DANGERS NORTHWARD AND NORTH-WESTWARD OF GASPAR STRAIT.

Chart, 2,137 [2,550]. Lat. 2° 23′ S. Long. 107° 15¼′ E.

Canning rock, composed of coral, and lying directly in the route of vessels proceeding towards Gaspar strait, is about half a cable in extent with a least depth of 3 fathoms over it, and 17 to 30 fathoms close-to. It lies with the summit of Gaspar island bearing W. by S., distant 10¾ miles. Vessels from the northward should approach Gaspar island bearing about S.W., until within 5 miles of it, in order to give this danger a wide berth.

Pare Joie reef, on which the vessel of that name remained aground for 24 hours, is reported to lie with Gaspar island summit bearing S. ½ E. distant 5¼ miles, but this position must be considered as doubtful, although a reef doubtless exists in this vicinity.

Warren Hastings reefs, composed of coral and five in number, extend about 2½ miles in a north-east and south-west direction. The southern reef, with 1¼ fathoms water over it and surrounded by depths of from 9 to 14 fathoms, lies with Gaspar island bearing E. by S. ⅝ S., distant 8 miles; the northern reef, on which the least depth is 2 fathoms, and 10 to 20 fathoms around, lies with Gaspar island bearing S.E. by E. ⅜ E.; the other three reefs have 2, 4½ and 5 fathoms water over them respectively. Between the reefs and Gaspar and Tree island there are depths of from 15 to 21 fathoms.

Lat. 2° 12′ S. Long. 107° 2½′ E

Belvedere rock, black, 10 feet above high water and about 40 feet in extent, is situated on a coral reef about half a mile in length in a north

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and south direction, and 3 cables in breadth, round which there are depths of from 8 to 13 fathoms; it lies with Gaspar island bearing S. by E. $\frac{1}{8}$ E., distant 13 miles. Chart, 2,137 [2,550]. Var. 1° 15′ E.

Half a mile to the eastward lies a small coral reef, with $4\frac{1}{2}$ fathoms water over it and depths of from 10 to 14 fathoms close to the northward; on the east point of the reef there is a depth of 3 fathoms, and round the reef from 15 to 17 fathoms; some parts of the reef are dry at low water and, with a heavy swell, the sea breaks on it, but by day, if keeping a good look-out, it may be avoided.

Tree reef, awash at low water, is 2 cables in length in a north-east and south-west direction, and lies S. by W. $\frac{3}{4}$ W. distant $1\frac{3}{4}$ miles from Belvedere rock. A small coral reef with $4\frac{1}{4}$ fathoms water over it lies one cable to the eastward.

Tijong reefs are some steep coral patches, the southern of which, with about 4 feet water over it and depths of from 7 to 15 fathoms close to, lies with the summit of Gaspar island bearing S.S.E. $\frac{1}{2}$ E., distant 10 miles.

One mile to the northward of this shallow depth lies a small reef, with 4 fathoms least water over it, and N.N.W. $\frac{3}{4}$ W. and W. by N. $\frac{1}{4}$ N., distant 5 and 9 cables, are other patches with 3 and 4 fathoms water over them respectively.

Sittard reef, of coral, lies with the peak of Gaspar island bearing S.E. by E., distant $23\frac{3}{4}$ miles. It is 4 cables in extent, "steep-to," with a least depth of $1\frac{1}{2}$ fathoms, and 12 to 16 fathoms close around. Lat. 2° 11½′ S. Long. 106° 45½′ E.

Magdalena reef consists of two rocky pinnacles, a quarter of a cable apart, with a least depth of $2\frac{1}{4}$ fathoms, and 14 to 19 fathoms between and around. The summit of Gaspar island bears S. by E. $\frac{1}{8}$ E., distant $23\frac{1}{2}$ miles from the reef. Lat. 2° 2′ S. Long. 107° 0½′ E.

Dido reef.—The Dutch vessel *Dido* reported in 1882 as having passed half a cable to leeward of a small reef, upon the south side of which breakers were visible; it was situated N.E. by E. $\frac{1}{2}$ E. about 15 miles from Magdalena reef. Chart, 2,149 [2,548]. Lat. 1° 55′ S. Long. 107° 14′ E.

Lanrick or Sumbing shoal, is a small coral reef about one cable in extent and "steep-to," with a least depth of $1\frac{1}{2}$ fathoms and 18 to 20 fathoms around. It lies with Gaspar island bearing S. by E. $\frac{3}{8}$ E., distant 33 miles. Lat. 1° 53′ S. Long. 106° 57½′ E.

Severn shoal, of coral, is 2 cables in extent, "steep-to," with a least depth of $1\frac{3}{4}$ fathoms over it and 17 to 18 fathoms around. It lies 27 miles Lat. 1° 37½′ S. Long. 106° 31½′ E.

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Chart, 2,149 [2,548]. Var. 1° 15′ E.

from the coast of Banka island, in the track of vessels from Toli island towards Gaspar strait, with the highest hill on Tuing point bearing West.

Severn shoal is probably identical with Actæon rock, on which H.M.S. *Actæon* struck in 1857, about 7 miles east-south-eastward of the above.

Lat. 1° 40′ S. Long. 106° 19′ E.

Iwan reef, of coral and "steep-to," is 2 cables in extent, and has a least depth of $1\frac{3}{4}$ fathoms over it with 14 fathoms close around. It lies W. by S. $\frac{1}{4}$ S., distant 13 miles from Severn shoal, and 14 miles from the coast of Banka, with the highest hill on Tuing point bearing W. by N.

Lat. 1° 12$\frac{1}{4}$′ S. Long. 106° 46$\frac{3}{4}$′ E.

Celestial reefs, the south-easternmost of a group of reefs extending 17 miles in an east and west direction, consist of three small coral patches lying close together; the least water, on the northernmost patch, is $1\frac{3}{4}$ fathoms.

Deva reefs consist of four shallow heads, about one mile in extent, and "steep-to," lying about 2 miles northward of Celestial reefs; there are depths of from 14 to 15 fathoms between the reefs and from 18 to 19 around.

Wild Pigeon reefs, lying about 5 miles westward of Celestial reefs, consist of two coral patches half a cable apart, and each half a cable in extent; the eastern reef has a depth of $1\frac{1}{4}$ fathoms, and the western 3 fathoms, over it, with 17 to 19 fathoms around.

Brukhuijzen reefs are two coral patches, "steep-to," lying in a north-west and south-east direction from each other, and about 3 miles north-westward of Wild Pigeon reefs; the northern, about 3 cables in extent, has $1\frac{3}{4}$ fathoms water over it: the southern reef 5 fathoms least water, and there are depths of 16 to 18 fathoms around.

Hawkins reef, about 2 cables in extent and "steep-to," has a least depth of $4\frac{1}{2}$ fathoms, with 17 to 19 fathoms around. It lies 7 miles north-westward of Celestial reefs.

Lat. 1° 7$\frac{3}{4}$′ S. Long. 106° 37$\frac{3}{4}$′ E.

Vega reefs consist of two coral patches one cable in extent, in a north-north-west and south-south-east direction, and "steep-to"; the southern has 3 fathoms, and the northern $4\frac{1}{2}$ fathoms, water over it, and there is a depth of 15 fathoms between, and 18 fathoms around, them.

Sumbing reefs consist of two small coral patches half a mile apart in an east and west direction, and about $1\frac{1}{2}$ miles west-north-westward of Vega reefs. The eastern patch, about 60 yards in extent, has $3\frac{1}{4}$ fathoms least water over it; the western a depth of $5\frac{1}{2}$ fathoms, with 18 fathoms around them.

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Northward of the western reef there are two small coral patches with depths of 8 and 9 fathoms over them. Chart, [2,548]. Var. 1° 15′ E.

Ingram reef is 3 cables in extent, "steep-to," has a least depth of 4 feet, with 17 fathoms around, and lies 3 miles west-north-westward of Vega reefs. About one mile to the westward of the reef there is a coral patch with 9 fathoms water over it. Ingram reef is the north-western reef of this group, and 13½ miles distant from Celestial reefs. Lat. 1° 6½′ S. Long. 106° 35′ E.

Enslie reef, a patch with a depth of 4¾ fathoms over it, lies 4 miles westward of Ingram reef, and is surrounded by depths of from 18 to 20 fathoms.

Rifleman reefs, the northernmost of these shoals, are two coral patches close together, over which the depths are 7 and 9 fathoms.

CAUTION.—This neighbourhood must be navigated with great caution, and the whole group of reefs should be given a wide berth.

Emerald Isle shoal, on which the American ship *Emerald Isle*, drawing 22 feet, touched, lies 28 miles east-north-eastward of Rifleman reefs. Lat. 0° 59′ S. Long. 107° 2½′ E.

Soundings were tried for immediately by that vessel after passing over the shoal, but bottom was not reached, although discoloured water was distinctly visible where the ship had touched. It was also unsuccessfully searched for by H.M. surveying vessel *Egeria* in 1890, but is still retained on the charts.

DIRECTIONS.—From Gaspar strait to the northward.—These directions chiefly apply to sailing vessels, as steamers usually take the direct route. Most vessels, bound to the northward from Gaspar strait, prefer passing eastward of Gaspar island, which is the safer route; but some, especially when bound to Singapore by Rhio strait, prefer the less safe, but more direct, route between the shoals westward of that island. *Continued from* pages 506, 528. Charts, 2,137 [2,550]; 2,149 [2,548].

To proceed eastward of Gaspar island, with a fair wind, a vessel should pass about 3 miles eastward of that island, and 6 or 7 miles westward of Canning rock. Having passed Gaspar island and the position assigned to Pare Joie reef (page 536), steer to the northward to bring the island to bear South, and keep it nothing to the eastward of that bearing as long as in sight.

This track leads about 5 miles eastward of Magdalena reef and nearly midway between Lanrick reef and Dido reef, reported to lie 15 miles north-eastward of Magdalena reef; caution must be exercised when in the locality until its existence is disproved.

If the wind should prevent a direct course from being steered, Gaspar island should not be brought westward of N.N.W. until the vessel is

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Charts, 2,137 [2,550]; 2,140 [2,548]. Var. 1° 5′ E.

northward of Akbar shoal; and, after Gaspar island is passed, it must be kept South as before.

Gaspar island is said to be visible from a distance of 32 miles, in clear weather, and, if passing eastward of the position of Dido reef, the summit of the island should not be brought to bear southward of S.S.W. $\frac{3}{8}$ W. If passing eastward of Canning shoal, when Gaspar island is near the bearing of W. by S., Petaling hill, on pulo Mendanau, should bear nothing to the eastward of S. by E. $\frac{3}{8}$ E.

Lat. 2° 25′ S. Long. 107° 2′ E.

To proceed westward of Gaspar island.—From a position about one mile westward of Glassa rock, steer North until the peak of Gaspar island bears S.E. $\frac{1}{4}$ E., when a N.W. $\frac{1}{4}$ W. course will lead between Warren Hastings reefs and Tijong reef; but great caution must be observed in the localities of these dangers.

When Berikat point bears S. by W. $\frac{3}{4}$ W. a vessel will be westward of Warren Hastings reefs and Tijong shoal, and, if proceeding east of Severn shoal, a N.N.W. course, or if intending to pass between it and Iwan reef, a N.W. $\frac{1}{2}$ N. course may be steered, allowing in each case for the set of the tidal stream, after which a course must be shaped to avoid the Celestial reef group.

If circumstances prevent a straight course from being steered when northward of Gaspar island, keep its summit between the bearings of S.E. by S. and S.E. $\frac{1}{2}$ E., which will keep the vessel clear of Warren Hastings and Tijong reefs.

Berikat point, bearing S. by W., leads westward of Warren Hastings reefs and Tijong shoals, and Gaspar island bearing S.E. leads 5 miles eastward of Sittard shoal; but when westward of Warren Hastings reefs and Tijong shoals it will be wise to edge away to the northward—always carefully guarding against tidal streams or currents—taking care not to bring Gaspar peak to the southward of S.S.E., to avoid Magdalena reef and Lanrick shoal.

If proceeding between Berikat point and Boompjes island, the point may be passed at the distance of 2 or 3 miles, and the island at one mile; then proceed to the N.N.W., taking care not to bring Boompjes island to the southward of S.E. by S., to avoid the south-west extreme of Warren Hastings reefs. Berikat point bearing S. by W. leads westward of those reefs; and bearing S. $\frac{1}{2}$ E. leads eastward of Sittard reef.

The passage near the Banka coast is beset with dangers, and others, unknown at present, may exist, therefore vessels are advised to give this coast a wide berth, especially as nothing is to be gained by approaching

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it. At page 534 directions are given to proceed along this coast to Marawang road.

Charts, 2,137 [2,550]; 2,149 [2,548]. Var. 1° E.

Approaching Gaspar strait from the northward.—In consequence of the northern entrance of Gaspar strait being so near the Equator, the winds, even in the strength of the monsoons, are very uncertain, producing a corresponding uncertainty in the direction and force of the tidal streams and currents. A sailing vessel approaching the strait from the northward will, therefore, have to be principally guided by the winds and currents which may have been encountered rather than by relying upon those which are mentioned to have been experienced at certain seasons.*

In thick weather the greatest caution is necessary when approaching Gaspar strait, for unless good observations can be obtained there is no means of ascertaining an exact position, and, under such circumstances, it is advisable to steer for Banka strait, where the soundings, on the edge of the bank extending from the Sumatra coast, may be a useful guide, although the land is not distinguished.

Vessels returning from Singapore or China early in the north-east monsoon, when the wind is generally North or N.W., and intending to go through Gaspar strait, usually pass between Toty and Dokan islands, off the north coast of Banka; a little later in the monsoon the wind is more easterly, and it is then better to pass from 10 to 20 miles eastward of Toty island.

If intending to pass between Iwan reef and Severn shoal, after passing Toty island steer S.E. ½ S. until Gunong Mangkol bears W. ½ S., when, being about 5 miles eastward of Sittard reef, a S. by E. course will lead about 3 miles eastward of Berikat point. Or, having passed Toty island, steer about S.E. by E., passing eastward of Severn shoal, so as to get on the meridian of Gaspar island before reaching the parallel of 1° 50′ S. Gaspar island is visible, in clear weather, at a distance of over 30 miles. When seen, bring it to bear South, and steer for it on that bearing until nearing the position assigned to Parc Joie shoal; then pass eastward of it, and steer to the south-westward for the entrance of the Macclesfield channel, the one usually taken.

Lat. 0° 54½′ S. Long. 105° 46′ E.

The above directions apply only to sailing vessels returning from China early in the north-east monsoon. In general, and especially returning late in the monsoon from China, when south-east and easterly winds are often met with between Banka and Belitung, it will be better to pass from 10 to 12 miles westward of St. Barbe

General chart, 2,140 [2,548].

* *See* the description of winds and currents, pp. 30, 35.

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Chart, 2,149 [2,548]. Var. 1° 5′ E.

island, and endeavour as soon as possible to get on the meridian of Gaspar island. When that island is seen, bring it on a South bearing and proceed as before.

Returning from China late in the monsoon, S.S.W. winds are often met in the southern part of the China sea, obliging vessels to pass between the islands near the west coast of Borneo. If this should happen in May or June, it would be tedious work getting to the southward; in such a case steer for the north-west extreme of Belitung and pass through Stolze channel.

General chart, 2,149 [2,548].

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CHAPTER IX.

CARIMATA OR KARIMATA STRAIT.

CARIMATA STRAIT.—General description.—Carimata strait, the easternmost of the channels leading from the Java sea into the China sea, lies between Belitung or Billiton island and the west coast of Borneo, and is 115 miles in breadth. The Montaran islands and reefs extend for about 40 miles eastward of Belitung, and the Carimata and other groups extend for about 50 miles south-west of Maya island, lying close to the Borneo coast, thus reducing the main strait to a breadth of about 45 miles, and in the fairway of which are the Ontario and Flying Fish reefs. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Carimata strait is the customary route from Bali strait or East Java for vessels bound to the Straits Settlements or China; it is also used by sailing vessels from Malacca strait, proceeding to China in the strength of the north-east monsoon, by the Eastern passages. Although much broader than either Banka or Gaspar straits, it is not so much frequented as either of those channels by vessels proceeding to and from China by way of Sunda strait; but it is, however, not unfrequently used by sailing vessels returning from China, which from the effects of winds or currents find it difficult to get to the westward.

The great breadth of Carimata strait, compared with the others, is of great advantage to vessels working, but this is partly counterbalanced by the several shoals which lie in or near the fairway and out of sight of land, as well as irregular currents, necessitating a dependence being placed on the reckoning. Notwithstanding, Carimata strait is a very serviceable fairway, and since the establishment of lights on Discovery East bank and Serutu island it may be used with more confidence, but a careful lookout should be kept for any possible uncharted dangers.

Besides the main channel, limited to the north-eastward by the Carimata islands, and to the south-westward by the Montaran islands and Belitung, there are several other channels between the numerous islands lying eastward and north-eastward of Carimata, and between it and the Borneo coast; the eastern of these, known as Greig and Inner channels, have a

General chart, 491*a* [2,555].

Hosted by Google

Chart, 2,160 [2,553]. Var. 1° 10′ E.

regular tide, and convenient depths for anchoring, and are therefore much frequented by vessels working through the strait; it being quite impossible to work through the Main channel against a strong monsoon, and a continuous rapid current setting to leeward.

Vigias.—With regard to reported shoals, Lieut. Hoskyn, commanding H.M. surveying vessel *Flying Fish*, remarks, that on three different occasions whilst at work in the neighbourhood of the Greig and Gwalia shoals, large floating masses of vegetable matter and other débris were fallen in with. One of these was so large that it could be seen from the bridge at a distance of 7 or 8 miles, and so dense that at a moderate distance it might readily have been mistaken in daylight for a rock. Another bore a striking resemblance to a small sandbank with a bush on it, and was visible from 5 to 6 miles.

Winds and Weather.—*See* page 30.

Currents.—The currents in Carimata strait depend greatly on the strength of the wind. During the strength of either monsoon, the current, when accelerated by the tidal stream, runs from 2 to 3 miles per hour with the wind; when the monsoon is light and the tidal stream is against the wind there is little or no current, and the tidal stream at times overcomes it. Also on page 35.

Tidal streams.—In the fairway between the Montaran group and Carimata island, and in the southern part of the strait, the flood stream runs to the north-westward and the ebb to south-eastward; southward of Borneo and Belitung, the flood runs to the westward and the ebb to the eastward; northward of Belitung the flood runs from W.N.W. to West, and the ebb from East to South-east. At Serutu island, Carimata group, the flood runs West and the ebb East.

Lat. 2° 59¾′ S. Long. 110° 18′ E.

On the west coast of Borneo, from Sambar point, the flood stream runs from North to N. by W., as far as Sukadana, where it meets the flood stream from the China sea running southward past Pontianak, through Greig and Inner channels. This fact should be borne in mind when working against the monsoon through these channels.

Pilots.— The fishermen on both sides of Carimata strait appear to be well acquainted with the shoals in their own neighbourhood, but from their little knowledge of other than small craft, few are able or to be trusted to take other vessels into the rivers. Away from their own neighbourhood they are of no use, beyond being quick of eye to discern shoals that a vessel may be approaching.

General chart, 491*a* [2,553].

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SOUTH, EAST, AND NORTH COASTS OF BELITUNG, WITH THE ADJACENT ISLANDS AND DANGERS.*

Chart, 2,160 [2,553]. Var. 1° 10′ E.

The whole of these coasts are fronted by many islets and dangers, and as those adjacent to the coast are out of the ordinary track of navigation, vessels are advised to give them a wide berth. The latter, with the coast, will first be described, followed by the Schaarvogel islands and the reefs bordering the main strait.

BELITUNG or BILLITON ISLAND, about 43 miles in diameter, forms the western side of Carimata strait. The island is unusually flat and wooded, with several scattered mountains, but no ranges of them. The north coast is higher and more rocky than the east and south-east sides. The island is but thinly populated, and few inhabitants will be seen except in the mining districts. Fishermen will be met with along the coast and at the Montaran islands, but they with their families live in boats, and move about to different localities. They are quite harmless, and it is stated will assist shipwrecked mariners. The population of Belitung island is about 32,000, including 8,000 Chinese miners.

Landmarks.—The hills north-eastward of tanjong Kiras, the south-west extreme of Belitung islands, attain elevations of from 1,000 to 1,207 feet above high water, but will not often be seen by vessels passing southward of White island; Rotan island, of the Schaarvogel group, is visible about 18 miles in clear weather; and Meleidong island near the coast, north-westward of Rotan, has a remarkable hill visible about 20 miles. These are useful marks for vessels northward of Schaarvogel island, or that are rather far to the westward of the fairway track.

At about 2 miles north-westward of tanjong Rusa is Belitung hill, 410 feet, and about 12 miles north-eastward is Mengarun, 774 feet above high water, with Tung peak eastward of it, forming useful marks in clear weather. Tung is conical, and standing alone is seen from a considerable distance; Mengarun is longer and flatter, and consists of three ridges lying close to each other. Lat. 3° 10′ S. Long. 107° 50′ E.

Burung Mandi, 1,417 feet above high water, near the east point of Belitung, has two peaks, and is a conspicuous mark. On the north coast Kelapa Kampit and the Sekaju hills are 17 miles apart, with some lower hills between them. Lat. 2° 45′ S. Long. 108° 14′ E.

Sekaju, 558 feet above high water, has a crater-like top, with a bare patch of red stones on its eastern side. Kelapa Kampit is 705 feet above Lat. 2° 36′ S. Long. 107° 50¾′ E.

* The west coast of Belitung island is described on p. 514.
General chart, 941*a* [2,555].

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Chart, 2,160 [2,553].
Lat. 2° 46½′ S.
Long. 107° 52′ E.
Var. 1° 10′ E.

high water, conical, and easily recognised. Tajem Bini and Tajem Laki, the highest peaks of Belitung situated 14 miles from the north shore of the island, are two very sharp peaks, each 1,673 feet above high water and conspicuous marks in clear weather.

Lat. 3° 14½′ S.
Long. 107° 37′ E.

SOUTH COAST. — From tanjong Kiras, to the southward of which lies Genting island, the coast trends eastward for about 3 miles to Batu Tungku point and then turns east-north-eastward, with some small bays, to Batu Penju point. From this the coast is more indented, and some small points are formed off which there are two small islands near tanjong Rusa, the south-west point of Balok bay.

A small reef which dries fringes the coast, which latter near Batu Tungku and Batu Penju points is rocky; some rocks above water lie in the bights, and small rivers run into the sea along the coast. The 3-fathoms contour line is about one mile southward of tanjong Kiras and continues about that distance off to tanjong Batu Tungku point, from which, distance one mile in an east-south-east direction, the Sebatok islets are just inside the 3-fathoms limit. These two small islets, lying close together, are surrounded by a reef which dries extending half a mile from their eastern side, and E. by N. ½ N., distant 3 miles from them, there is an islet also surrounded by a reef that dries.

The 5-fathoms contour line, which at tanjong Kiras is close to that of 3 fathoms, is 2 miles from the shore south-south-eastward of Batu Penju point.

Kwart-vadem reef lies S. by E., distant 1½ miles from the southern Sebatok islet; it is about a cable in diameter with depths of 6 fathoms around.

Lat. 3° 16½′ S.
Long. 107° 44½′ E.

Ketupai, a small islet about a cable in extent, is 4 miles east-south-eastward of Sebatok islets; it is surrounded by a drying reef, which extends 2 cables from its east side.

Keramia islets (Karang Mia) lie 2 cables in an east-south-east and west-north-west direction from each other, on a coral reef, "steep-to," which dries at low water, and extends 3 cables eastward of the islets; the eastern islet is the larger of the two.

Banks, which dry, lie W. by N., distant half a mile and 1$\frac{2}{10}$ miles; and E.S.E., 8 cables from Keramia islets and northward, commence the islets, reefs, and banks on the west side of Balok bay.

This coast should not be approached within 4 or 5 miles, on account of off-lying shoals and islets.

BALOK BAY, between Rusa and Kalumpang points, is about 11 miles wide, and to Balok river at its head is about 8 miles deep.

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Kalumpang point is low, rocky, and covered with high trees. The bay is encumbered with shoals, but the most dangerous of those bordering the channel to the settlement are marked by beacons, which afford easy navigation to those locally acquainted. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Dindang, the settlement, lies on the eastern side of the bay, near the head, off which at one mile distant there is anchorage in 3½ to 4 fathoms water, over mud.

From Dindang there are roads to the principal towns in Belitung.

Umpang islets and reefs occupy a space, 4½ miles in length in a north-east and south-west direction, in the fairway of the approach to Balok bay. Between these islets, which are overgrown with shrubs, and the dangers extending 3 miles westward of Kalumpang point, the channel is about 3 miles wide, with depths of from 4 to 6 fathoms. Rocks above water extend also about 1½ miles south-eastward of Kalumpang point. Lat. 3° 17′ S. Long. 107° 52½′ E.

The channel westward of Umpang islets is 2 miles wide, with depths of 9 and 10 fathoms.

Beacons.—A beacon with ball marks the north-east extreme of Umpang islet reefs, and a similar beacon marks the west extreme of the reef at 2 miles northward of it. Two beacons with cross pieces mark the middle ground westward of the latter; thence to the settlement, beacons with cones mark the east side, and beacons with balls the west side of the channel. These must not be depended on.

Directions. — Approaching Balok bay from the westward pass about a mile southward of Ketupai island, in depths of from 7 to 8 fathoms, over blue clay, and steer for Umpang islet, which is covered with shrubs, until the north-east side of Keramia bears N.W. ¾ W., when alter course to N.E. ⅜ E. for the middle ground, marked by two beacons which should be approached to three-quarters of a mile distant.

With the southern of the ball beacons bearing N. by W. ¾ W. steer about N. ½ W., passing eastward of the southern ball beacon, and between a beacon with ball and one with a cone, after which a N. ¼ E. course leads to the anchorage. Vessels from the eastward steer for the ball beacon, north-eastward of Umpang islet, bearing N.W. by N., and from a position south-westward of the middle ground, proceed as above.

Coast.—From Kalumpang point the coast, which is low and thickly wooded with high trees, trends eastward for 6 miles to Batu Itam point, north-eastward of which is a bay about 4 miles deep, with Liendang, Tepi, and other islands lying eastward of it; Batu Itam point is low, rocky, and fringed by a small coral reef which dries. The shores of the bay are foul to the distance of half a mile, and its head is mostly foul, Lat. 3° 16′ S. Long. 107° 59½′ E.

General chart, 941*a* [2,555].

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

but there is a narrow passage between the fringing reef, with a depth of 3½ fathoms to 4 fathoms within.

Anchorage.—This bay affords anchorage during the north-westerly monsoon, in from 4 to 6 fathoms water, over mud, about 1½ miles southward of Sembulu islet; access from the southward is easy, keeping towards the western shore to avoid the shoals lying about 2 miles south-eastward of Tepi island.

Lat. 3° 9′ S. Long. 108° 13′ E.

EAST COAST.—Tapok point is the eastern point of the bay just mentioned. Sekapar island lies 2 miles eastward of it, beyond which, at about the same distance, are two small reefs. From Tapok point the coast trends in a north-north-east direction for 16 miles to Samak point, and between these points is foul in places to the distance of 6 miles.

Beacons.—Two small coral patches situated E. ⅛ N. and E. ⅜ S., distant 1½ and 2 miles respectively from Sekapar island, are marked by beacons.

Merai islands and reefs lie midway between Tapok point and the Schaarvogel islands; Merai, the large island, is about 1¼ miles in length in a north-north-east and south-south-west direction, with islets and reefs extending 2 miles eastward, and 6 miles to the north-eastward; a shallow patch also lies about 2 miles, S. by W. ½ W., of Merai island. Between that island and Tepi island is a group of islets and reefs 2 miles in extent.

Beacon.—A beacon (liable to be washed away) marks the southern shoal of the group.

Selanduk island, about 2½ miles in length, lies nearly 5 miles northward of Tapok point, and 1½ miles off shore, the passage between being only available for boats.

Selanduk may possibly be recognised by a solitary tree standing on the hill over the east point of the island, if it still exists.

Lat. 3° 4′ S. Long. 108° 18½′ E.

Meleidong island lies 2 miles eastward of Selanduk, and has several shallow patches from one mile to 1½ miles southward of it. There is a channel, with from 5 to 6 fathoms water, between Meleidong and the Ajam islets lying eastward of Selanduk, which is used by the mining company's steamers calling at Lingang river, 3½ miles westward of Selanduk.

Meleidong is a conspicuous and useful mark for avoiding the dangers northward of Schaarvogel islands. It has a remarkable hill on its north extreme, which is visible from a distance of 20 miles in clear weather.

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Selumar hill, 551 feet above high water, 4 miles west-north-westward of Medong point, is possibly also a useful mark. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Lingang river, the entrance to which is 7 miles northward of Tapok point, is the most important river on the east coast of Belitung. It has 8 feet at low water over the bank in a very narrow channel, in places not more than 10 yards in width, but deepens to 2 fathoms in the river.

Anchorage.—There is anchorage at about 2 miles off Lingang river in 3 fathoms water, over mud; in approaching it, the north extremes of Meleidong and Selanduk should be passed within half a mile, to avoid the shoals lying 1½ miles north-eastward of these islands, northward of which the ground is foul. The Belitung tin mining company have beaconed the shoals between Meleidong and Selanduk, but they are not to be depended on.

Tides.—Spring tides rise about 6 feet, ordinary tides 4 feet.

Samak point, situated 9 miles northward of Selanduk island and the point just northward of it, forms the eastern extreme of Belitung island; a small hill standing on Samak point close to the sea is conspicuous, and may be seen from a distance of 20 miles. Lat. 2° 53½′ S. Long. 108° 17½′ E

Manggar river entrance is 4 miles northward of Samak point and has 3 feet at low water in it. The town of Manggar, situated about 4 miles up the river of that name, lies about 1½ miles north-west of the hill on Samak point.

Reefs.—From Samak point, reefs in the form of a crescent extend about 12 miles in a south-east direction, to within 3 miles of West Protet reef (page 554). The chart must be consulted for further information on these dangers, the neighbourhood of which should be avoided by strangers.

Bakau Limau, situated 6½ miles eastward of Manggar river, is a flat, densely wooded island, with a conspicuous high tree near its centre, which has a flat top and may be seen from a distance of 15 miles; a coral reef, dry at low water, extends one mile in a south-east direction from the island; the other sides are "steep-to," but have outlying rocks. Lat. 2° 49′ S. Long. 108° 25′ E.

Siadung island, a low thickly-wooded islet, one mile north-east from Bakau Limau, is surrounded by reefs extending to the distance of a mile on its south and south-east sides.

Madau reef, about half a mile in extent, upon which is a sandbank having some brushwood on the centre, lies with Burung Mandi point bearing W. ⅜ N., distant 5¾ miles. A small coral patch lies N.W. ½ N. nearly 2 miles from it.

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

NORTH COAST.—The north coast of Belitung is generally high, and has many peaks useful as landmarks for ascertaining a vessel's position in fine weather. Tajem Bini and Tajem Laki, about 14 miles from the north coast of Belitung, are each 1,673 feet above high water, as before stated. Fishing villages will be found at the mouths of the small rivers, but they are of little importance, and afford no supplies.

Lat. 2° 45′ S. Long. 108° 17′ E.

Burung Mandi point and hill.—From Manggar river the coast trends northward for about 5 miles to Burung Mandi point, high and rocky, over which is Menang hill; at 2 miles westward of it is Burung Mandi, a table-topped hill with two peaks, and 1,417 feet above high water. From the point the coast takes a north-west direction for about 17 miles to Buding bay and river. Between Samak and Burung Mandi points the coast is dangerous within distances of 3 or 4 miles, but north-westward of the latter, guarding against some isolated shoal patches, it is safe to approach within 1½ miles.

Lat. 2° 42′ S. Long. 108° 5½′ E.

Kelapa Kampit, 705 feet above high water, is conical shaped and situated about 7 miles south-westward of Pering river; when seen from the northward the western slope is not so steep as the eastern.

Dangers.—A patch with 4 feet water over it, and depths of from 6 to 8 fathoms around, lies 2 miles off shore, with Burung Mandi hill bearing about S.W. ½ S.

A sandbank, dry at low water, lies 2½ miles off shore, with Burung Mandi hill bearing S. ½ W. A sunken rock lies three-quarters of a mile westward of it.

Lat. 2° 37′ S. Long. 108° 13′ E.

Several shallow patches lie from one mile to 1½ miles north-eastward from Kluang point, the east side of the entrance to Pasiran river; also at 1½ miles off shore, about 2 miles north-westward of Pering point.

Pigeon island (pulo Kanis) is a small, low island lying nearly 4 miles north-eastward of Kluang point. A reef extends half a mile south-east, and nearly one mile north-west of it, and a coral patch, with a depth of one fathom over it, lies about one mile, S. by E. ⅛ E., of the island.

BUDING BAY, at about 10 miles west from Pigeon island, is 2 miles in breadth, and at its head is the mouth of the Buding, the largest river on the north coast of Belitung. From Buding point, on the eastern side, a reef extends three-quarters of a mile into the bay, and with the reef extending from the western shore reduces the portion which has depths of 3½ to 4 fathoms, to the breadth of half-a-mile; from these depths the bay gradually shoals to 1½ feet at the entrance to Buding river, distant about 2½ miles.

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Town.—Buding town is situated 4 miles up the river, and is the principal town of the district from which tin is exported. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Reefs extend nearly 2 miles off the coast eastward of Buding point, and about 2½ miles north-eastward of Kerupit, the west point of entrance, between which there are depths of 6 to 7 fathoms, leading to the anchorage. At 6 miles N.E ½ E. from Buding point, lies a coral reef 5 cables in length in an east and west direction and 3 cables in breadth, with one fathom water over it, and "steep-to"; and at 3¾ miles, N. ¾ W. from the same point, is a coral patch, with a depth of 2¾ fathoms over it, also "steep-to."

West channel.—Beacons.—Between Kerupit point and the off-lying shoals is a channel, marked by beacons, surmounted by triangles on the starboard, and balls on the port, hand, but they are not to be depended on. The entrance is between the barrier reefs at about half a mile eastward of Keran island.

Anchorage.—There is good anchorage in Buding bay in 3¾ fathoms water, over mud, with Buding point bearing N.E. by E. ¾ E., distance about one mile, and the east side of Keran island touching Kerupit point about N.W. ¾ N.

Directions.—Approaching Buding bay from the north-eastward, bring Buding point to bear S.S.W. ½ W., and steer for it, until the sandbank on the reefs 2 miles north-east of Kerupit point bears N.W.; then alter course to W. by S. ¾ S., until the west point of Buding river bears about S. by E. ⅛ E., when steer for it until the east extreme of Keran island touches Kerupit point, anchoring in about 3¾ fathoms water.

From the westward, coasting steamers with local knowledge pass, inside the reefs, by a channel situated half a mile eastward of Keran island, where in the fairway there are depths of 7 fathoms; thence passing half a mile off Kerupit point between the beacons, two on each side, thence south to the anchorage.

COAST.—Keran island, 3 miles north-westward of Buding point and one mile off shore, has several tall, straggling trees on it. It is encircled by a reef, which extends 4 cables eastward, nearly one mile westward, and is "steep-to" on the northern side. Lat. 2° 33′ S. Long. 107° 59½′ E.

Mulut island, situated 4 miles westward of Keran island, and one mile off shore, appears from the offing as a small rounded hill, with two remarkable trees on the summit. The island is connected by a reef with Bulu island, 3 miles to the westward, and nearly to Keran island reef to the eastward.

General chart, 941*a* [2,555].

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

Dangers.—A dangerous coral reef, with one fathom water over it and "steep-to," lies 4⅓ miles N. ⅛ W. from Mulut island.

Juroh Dajong rock, with a depth of 5 feet over it, lies N.N.E. ¼ E., distant 1½ miles, and a similar reef lies N.N.W. ½ W. distant 2 miles from the same island.

Lat. 2° 31½′ S. Long. 107° 50′ E.

Tanjong Siantu, 6 miles westward of Mulut island, may be recognised by a conical hill, and also a small conical-shaped wooded islet of the same name off it; the ground is foul for about one mile seaward of the point, and a patch, with a depth of 3 fathoms over it, lies 2½ miles, N.N.E. ½ E., of the point.

Babi and Bulu islets, eastward of tanjong Siantu, are merely rocky shoals, covered with vegetation.

Sekaju hill, 558 feet above high water, with a crater-like top, lies 4 miles southward of tanjong Siantu, and is a useful mark on this coast.

Coast.—From tanjong Siantu the coast takes a westerly direction for about 10 miles to the north-west extreme of Belitung, abreast of which are the Eleven islands; thence the coast trends southward into Gaspar strait, *see* page 524. The whole of this coast is fronted with islets and reefs to the distance of 2½ miles, and it is advisable to give it a wide berth.

Sijuk, the chief town of the district of the same name, is situated at the mouth of a river about 4 miles westward of tanjong Siantu.

Lat. 2 24′ S. Long. 107° 49′ E.

Dangers.—The British ship *Empress of China* was reported to have struck on a reef about 7½ miles, N. ¾ E., of tanjong Siantu.

Lat. 2° 29¾′ S. Long. 107° 45½′ E.

Batu Malan Saluting, an isolated coral patch on which there is a depth of 2 fathoms, lies with tanjong Siantu bearing E. by S. ¾ S. distant about 4 miles. A similar reef lies W. ¾ S. about 4 miles from Batu Malan Saluting, and about midway between it and Alwina shoal.

Sowerby, a reef, the existence of which is doubtful, is charted N.N.W. ⅞ W., distant 19 miles from Batu Malan Saluting.

ISLANDS AND DANGERS ON WEST SIDE OF CARIMATA STRAIT, AND IN THE FAIRWAYS.

A description of that portion of the dangers southward of Belitung which lie contiguous to Gaspar strait, is given at pages 513, 514. The following islands and dangers lie nearer Carimata strait, and are important to vessels approaching it from the southward :—

Lat. 3° 47′ S. Long. 108° 4½′ E.

KEBATU, or Shoe island, situated about 31 miles southward from Kalumpang point, the south point of Belitung island, is 346 feet above high water, 3 cables in length by 1½ cables in breadth, conical in shape, partially wooded, and "steep-to," with a fringing reef which extends

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about 2 cables from its north-west side. This island, situated on the western side of the south entrance to Carimata strait, and being visible in clear weather from a distance of 23 miles, forms an excellent object to make for when entering the strait from the south-westward. Chart, 2,160 [2,553]. Var. 1° 10′ E.

White island, 57 feet above high water, wedge-shaped, and of a white colour, having a few stunted trees on the top, lies one mile south-west from Kebatu island. A shoal with 6 feet water over it, and "steep-to," lies 2 cables north-east from White island, with a depth of 10 fathoms between.

Zephyr rock, about a cable in extent, nearly dry at low water, and on which the sea generally breaks, is "steep-to," and lies 6 cables, N.N.W. $\frac{3}{8}$ W., from White island.

Karang Kawat, or Grace reefs, on which the sea breaks heavily in moderate weather, consist of two coral patches, the centres of which lie N.N.E. $\frac{3}{8}$ E., distant 4 and 6 miles respectively from Kebatu island, with White island open westward of it. Lat. 3° 42½′ S. Long. 108° 7½′ E.

These reefs are from 2 to 3 cables in extent, with from 12 to 16 fathoms at less than a cable distant all round. The northern reef dries 4 feet, and the southern is awash at low water.

Between Kebatu island and Grace reefs there is a channel $3\frac{3}{4}$ miles wide, with depths of 14 fathoms, over mud.

Ketapang island, lying about 8½ miles, S. $\frac{7}{8}$ W., from Kalumpang, the south point of Belitung, is a low, swampy, but wooded island about a third of a mile in diameter and surrounded by a reef, which on the south-eastern side extends to the distance of 3 cables, with depths of 8 and 9 fathoms around it. Lat. 3° 24½′ S. Long. 107° 58′ E.

The tops of trees are visible from a distance of about 16 miles, and form a good landmark for Balok bay.

SCHAARVOGEL ISLANDS, situated from 12 to 20 miles south-eastward of Tapok point, are low, thickly wooded (the tops of the trees being about 100 feet above high water) and surrounded by reefs and sandbanks; many of these dangers are "steep-to," the lead giving no indication when approaching them.

There is a passage through the group, both east and west of Penerus island, situated 3 miles south-south-eastward of Rotan, and westward of Rotan island.

Rotan, the northern island, is the largest, and has a remarkably tall tree near its centre, visible from a distance of 18 miles; reefs extend about 2 miles north-east and south-west of the island. Pengapiet, the south-eastern island, is divided into two parts by a channel dry at low water. Lat. 3° 15′ S. Long. 108° 23½′ E.

Hosted by Google

Chart, 2,160 [2,553]. Var. 1° 10′ E.

The three eastern islands are named Langke, Lung, and Ayerasin, Langke being the southernmost. Patches of coral extend about 4 miles north-eastward and 3 miles south-westward of the group, and there are many detached patches north-eastward and eastward of the Schaarvogel islands.

Sandbanks extend several miles north-north-east and in an opposite direction from Schaarvogel islands or parallel to the Belitung coast, with general depths of 8 or 9 fathoms, but there are several isolated and dangerous coral reefs on them. Between these banks are channels with depths of 15 to 20 fathoms, over mud, or sand and mud. Tidal rips may generally be observed over this irregular bottom, and with fresh breezes some of the reefs will be seen to break. It is advisable to pass well to the eastward of the dangers now to be described.

Lat. 3° 2¼′ S. Long. 108° 30¾′ E.

East Protet reef, having one fathom water over it and 12 fathoms around, generally breaks. It is 3 cables in length in a north and south direction, one cable in width, and lies with the centre of Rotan island bearing S.S.W. $\frac{5}{8}$ W., distant 14¼ miles; strong ripplings have been observed about 2 miles east-north-eastward of the reef.

Dangers.—From East Protet shallow patches lie S.E. by S., distant 2¾ miles; S.W. ¼ S., nearly 3 miles; S. ¼ E., 6½ miles; S. by W. $\frac{3}{8}$ W., 6½ miles, and a patch of 3¼ fathoms S. $\frac{3}{8}$ E., 8½ miles.

West Protet reef, of coral, with 1¾ fathoms water over it, lies W. by N. ⅛ N., distant 2½ miles from East Protet, with Rotan island centre bearing S. by W. ¾ W.

OUTLYING DANGERS.—Osterly reefs consist of five shallow coral patches, all of which are "steep-to" and generally marked by breakers.

Lat. 3° 17¾′ S. Long. 108° 38¼′ E.

North Osterly is 3 cables in length in a north and south direction and 2 cables in breadth, and nearly dry at low water; it is surrounded by depths of from 12 to 18 fathoms, and lies with the centre of Rotan island bearing W. ¾ N., distant 15 miles.

East Osterly dries at low water, and lies S. by E. ⅛ E., distant 3 miles from North Osterly.

South Osterly reef, lying S.W. $\frac{3}{8}$ W., distant 1¾ miles from East Osterly, is 3 cables in length in a north-north-west and south-south-east direction, with a dead coral islet about 40 feet in length, and about 3 feet above high water.

Westward of these dangers there is a channel a mile in breadth, with depths of more than 20 fathoms over mud, to the westward of which a

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coral patch, with 3¾ fathoms water over it, lies W. ¾ S., distant 2½ miles, and another, on which the depth is one fathom, lies nearly West, distant 4¼ miles from North Osterly ; from the latter danger the centre of Rotan island bears W. by N., distant 11 miles. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Tides.—The rise of tide at springs is from 4½ to 5 feet, ordinary tides 2½ to 3 feet.

Tidal streams.—Near the Osterly reefs the flood runs north-westward, and the ebb about south-south-eastward. In November and December no flood stream was observed.

Bower shoal, a coral patch three-quarters of a cable in extent, with a depth of 1½ fathoms over it, and "steep-to," lies 6½ miles southward of South Osterly reef, with the centre of Rotan island bearing N.W. ¼ W., distant 19½ miles. It stands near the middle of a narrow sandbank, over which the depths are from 6 to 10 fathoms, extending 12 miles in a north and south direction. South Osterly reef stands on the north extreme of this bank. Lat. 3° 28½′ S. Long. 108° 37¼′ E.

Ayer Masin or Discovery West bank, lying nearly 14 miles south-eastward of Bower shoal, is 7 cables in length in a N. by W. and S. by E. direction by 2 cables in breadth, composed of coral, with a small portion awash at high water, spring tides. There are depths of from 15 to 17 fathoms around the bank at a distance of one cable, and it nearly always breaks at high water. Lat. 3° 39¼′ S. Long. 108° 45½′ E.

Discovery reef lies N.E. ⅞ E., distant 5½ miles from Ayer Masin; it is 2 cables in diameter, 5 cables in length in a north and south direction and 2 cables in breadth, dries about 3 cables at low water, and has several boulders awash at high water. The reef is surrounded by depths of from 16 to 22 fathoms at the distance of one cable, and the breakers may generally be seen from a distance of 5 or 6 miles.

Discovery East bank (Gusong Mampango), lying E. by N., distant nearly 26 miles from Ayer Masin, is 4½ cables in length in a north and south direction, 1½ cables in breadth, and has, in its centre, a decayed white coral ridge 5 feet above high water; there are depths of from 14 to 25 fathoms, over sand, around this bank.

LIGHT.—On Discovery East bank a dwelling on piles, 79 feet in height and painted white with a red lantern, exhibits, at an elevation of 85 feet above high water, a *white group flashing* light, which shows *two short flashes* every *ten seconds;* it should be visible, in clear weather, from a distance of 14 miles. Lat. 3° 34¼′ S. Long. 109° 11′ E.

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

Karang Juruk (Lavender bank), lying N.W. ½ W., distant 15 miles from Discovery East bank, and E. by S. ¼ S. 37 miles from Rotan island, is 9 cables in length, in a north-north-west and south-south-east direction, 2 cables in breadth, and composed of coral, with several large, black, boulders awash at high water; around this bank there are depths of 15 to 20 fathoms, over sand and shells, at the distance of one cable.

Breakers on Karang Juruk have been observed from aloft at a distance of 6 miles during a south-easterly breeze.

Lat. 3° 16′ S. Long. 108° 58¾′ E.

Karang Batuan, lying N. ⅜ W., distant 8½ miles from Karang Juruk, is half a mile in length and one cable in breadth.

A black rock, near the centre of the bank, which dries for about 50 yards, is barely covered at high water. The depths around the bank are from 21 to 27 fathoms.

Lat. 2° 54½′ S. Long. 108° 56¾′ E.

Cirencester shoal lies with Merajah island, of the Montaran group, bearing N.W. ¾ N., distant 22 miles, and the same distance northward of Karang Batuan. It is half a cable in extent, with a least depth of 2 fathoms, and 13 to 17 fathoms close around. The water about the bank is not discoloured, but tidal rips may usually be seen.

A small and narrow sandbank on which the depth is 4¾ fathoms lies S. by W. ½ W., distant one mile from Cirencester shoal.

MONTARAN ISLANDS consist of a group of islets, sandbanks, and coral reefs, extending 40 miles in an easterly direction from the north-east coast of Belitung. They are all uninhabited, but are frequented by the fishermen from the neighbouring coast of Belitung. With the exception of Nangka the islands are low, and are all covered with vegetation.

Between the islands are many dangerous coral reefs, "steep-to," and the whole group must be considered unsafe navigation for any but small craft. All vessels should pass eastward of the islands and their outlying dangers.

WEST GROUP.—The west Montaran group consists of eight islands, and several rocks above water.

Lat. 2° 30′ S. Long. 108° 33′ E.

Nangka island, the most prominent of the Montaran islands, is 1¼ miles in length by three-quarters of a mile in breadth; it rises in two densely wooded peaks, which at a distance appear like two separate islands. The southern peak is 549 feet, and the northern peak 415 feet above high water, and in clear weather the island may be seen from a distance of 32 miles.

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This island is surrounded by a coral reef, which on the north side extends half a mile off. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Rock.—A sunken rock lies three-quarters of a mile, N.E. ⅔ N., of the island.

Sembilan, situated about three-quarters of a mile westward of Nangka, is a sandy islet covered with trees and surrounded by a reef, leaving a narrow passage between the islands. Lat. 2° 30½′ S. Long. 108° 31½′ E.

Foul ground exists for one mile westward of Sembilan, and a small coral reef, with 6 feet water over it and "steep-to," lies S. ½ W., distant 1 4/10 miles from the island; this danger lies near mid-channel of the passage between Sembilan and Sekumpul islands, which otherwise has depths of from 10 to 15 fathoms.

Three islands lie close together southward of Nangka island. Sekumpul (96 feet), the northernmost, is distant about 2 miles, and Gampal or Telegapat, the southernmost and largest, 106 feet above high water, about 3½ miles from the south end of Nangka island; it may be known by two rocky hills near its south point. These islands are low, consisting merely of mangroves and other trees (from 90 to 100 feet above high water) growing on coral reefs.

Dangers.—At 2 miles west of the south point of Gampal island is a coral reef with some rocks on it which dry at low water; it is 3 cables in length in a north and south direction and one cable in breadth, is surrounded by depths of from 11 to 16 fathoms, and generally shows by breakers.

A group of coral and rocky patches extending 2 miles in a north and south direction with a breadth of one mile, and on which there are three sand patches above high water, is situated about 2½ miles east of Gampal island; the northern drying patch lies 2½ miles eastward of the south point of the island.

Nearly midway between this reef and Gampal island there is a shoal patch; and a detached reef with a least depth of 2 feet over it, but showing little discoloration of water, lies S.E. ¾ E. distant about a mile from the south-west point of the island.

Napier or Maranai island, lying 5 miles south-westward of Gampal island, is densely wooded, three-quarters of a mile in length, 90 feet above high water, and surrounded by coral reefs, which on the north and north-west sides, extend about three-quarters of a mile, on the east about a mile, and south-east about 1½ miles; it is somewhat hilly.

A reef about 100 yards in length in a north-west and south-east direction, with a depth of 3 fathoms over it, lies with the south point of

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

Napier island bearing N.E. by E. ¼ E., distant 2 miles, and a patch with 1½ fathoms water over it lies about a mile north-eastward of the island.

Lat. 2° 38′ S. Long. 108° 30½′ E.

Gusong Baru, situated on a reef about one mile east of Napier island, is small and sandy, with a few trees, 26 feet above high water.

South or Sadung island, about 2½ miles, S. ¾ W., of Napier island, is a sandbank surrounded by a coral reef, and thickly covered with trees. The passage between it and Napier island is blocked by reefs which occasionally break.

Bakau island, about 4 miles westward of South island, is low with bushes near its centre. A small sandy islet with some trees lies a short distance from its north-east point. A reef extends 1½ miles, E.S.E., from the island, also half a mile north-west, and a shoal patch lies about half a mile off its south-west side.

Paperak island, situated about one mile south-south-eastward from Bakau, is small and densely wooded with high trees. A reef about one mile in extent, with 2 to 3 feet water, lies one mile west of the island, and several coral patches exist between the island and Burung Mandi point.

Lat. 2° 34¼′ S. Long. 108° 28′ E.

Lenore reef, situated N.W. ¾ N., distant 3¼ miles from Napier island, is a small coral reef with 1½ fathoms water over it, and "steep-to."

A reef, with 3¾ fathoms water over it, and depths of from 16 to 23 fathoms around, lies 2½ miles, N.E. by E. ¾ E., of Lenore reef.

West Lenore reef, 3 cables in length in a north and south direction, by 2 cables in breadth, lies S.W. ¾ W., distant 8½ miles from the south hill of Nangka island, has 2 fathoms water over it, and from 15 to 21 fathoms close around. It neither breaks nor shows discoloured water.

Corcyra reef, composed of coral and about 3 cables in diameter, with 1½ fathoms water over it and depths of from 16 to 19 fathoms around, lies with the south peak of Nangka island bearing E. by N., distant 3½ miles. It is not distinguished by breakers nor discoloured water.

Lat. 2° 29¾′ S. Long. 108° 15½′ E.

Hydrograaf reef, extending one mile in a north-west and south-east direction and about 4 cables in width, has a least depth of 3 feet over it, from which Pigeon island bears S. by W. ⅝ W., and the south peak of Nangka island E. ⅛ S. The reef is "steep-to," with depths of from 15 to 20 fathoms, over sand and small stones, within one cable.

Gusong Serlang, one mile in length in a north-west and south-east direction and 3 cables in breadth, has a bank of brown sand above high water on its north-west part, from which Pigeon island bears

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W. by S. ¾ S. distant 6½ miles. Depths of 12 to 16 fathoms were found close around this reef. Chart, 2,160 [2,555]. Var. 1° 10′ E.

Nearly midway between Gusong Serlang and Bakau island are two detached coral patches, having one fathom and 1¾ fathoms water over them.

MIDDLE GROUP.—Merajah island, the largest of the Montaran Middle group, is low, flat, and covered with mangroves. The fringing coral reef extends in places to the distance of half a mile. Lat. 2° 35½′ S. Long. 108° 44′ E.

Big tree island (Bulian), 151 feet above high water, and the highest of the Middle group, is thickly wooded, and surrounded by a coral reef which extends half a mile north-west and south-east from the island.

Tempuling is a small, low islet situated one mile westward of Big Tree island.

Channer island (Berisi), half a mile west of Merajah, is 79 feet above high water and similar to Tempuling, having reefs extending 2 cables from its north and south points.

Warren reef, N.W. by W. ⅛ W., distant 4 miles from Channer island, is a small bank of red coral 5 feet above high water. Shallow patches lie about three-quarters of a mile north and south of Warren reef, and a similar patch lies 2 miles, W. by S., of it.

Gubbins reef, 2½ miles northward of Tempuling, is a large reef, having near the middle a bank of dead coral 5 feet above high water. This reef is nearly connected with the Middle group by two other reefs. At 1½ miles eastward of Gubbins reef is another large reef, with detached heads off it.

Luctor reef, a patch dry at low water, lies about 2 miles, W. by S. ½ S., of Gubbins reef, with a patch of 3¾ fathoms, on which the *Luctor* struck, at 1¼ miles, N.W. ¾ N., from it. A patch of 2½ fathoms is charted about one-third of a mile south-west of the dry patch.

East island (Pesemut), the easternmost of the Montaran islands, is about half a mile in extent, of coral formation, thickly wooded and surrounded by a sandy beach. The trees in the centre form a sharp pointed clump 112 feet above high water, making the island conspicuous and easily recognised when seen from a distance. Isolated coral patches extend one mile off the south-east part of the island. Lat. 2° 30′ S. Long. 108° 51′ E.

Small island (Tuan), 66 feet above high water, situated S.S.W. ½ W., distant 2 miles from East island, is about one-third of a

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Chart, 2,160 [2,553]. Var. 1° 10′ E.

mile in length, and covered with trees; it is surrounded by a reef which extends about 3 cables north-north-west and south-south-east 2 cables from it.

Lat. 2° 30½′ S. Long. 108° 52½′ E.

Justina reef, half a mile in length, has a sandbank above high water, one cable in extent, on its south end, and is surrounded by depths of from 12 to 15 fathoms; it lies with East island bearing W. by N. ¾ N., distant 1½ miles.

Whittingham reef, lying 2 miles, N.E. by E. ½ E., from East island, is small, with 2½ fathoms water over it. In the centre of the triangle formed by this reef, East island and Justina reef, is a small patch of 1½ fathoms.

Catherine or Evans reef, about 2 cables in extent, has a least depth of one fathom over it, with East island bearing W. ⅝ N., distant 4½ miles. Patches of 4 and 6 fathoms lie about half a mile north-eastward of it. This danger is "steep-to" with depths of from 8 to 15 fathoms around, and is rarely indicated by breakers or discoloured water.

Lat. 2° 25′ S. Long. 108° 41½′ E.

Condor reef consists of two small coral patches 2¼ cables apart, in a north-east and south-west direction; the northern has a depth of 3 fathoms and the southern 2½ fathoms water over it, with 16 to 17 fathoms between: from the southern patch, East island bears S.E. by E. ¾ E., and Nangka south peak S.W. by W. ⅛ W., distant 10 miles. The edges of the reef are "steep-to," and it has not been observed to break.

Lat. 2° 13′ S. Long. 108° 37′ E.

Flying Fish reef consists of a number of coral patches which occupy an area of half a mile square; the southern patch has a least depth of 3 fathoms over it, and lies with Nangka island peak bearing S. by W. ⅛ W., distant 18 miles. The other patches have depths of from 7 to 10 fathoms, and are "steep-to," with 19 to 20 fathoms between them; outside them the depths are from 24 to 30 fathoms, over sand or mud.

Lat. 1° 59½′ S. Long. 108° 39′ E.

Ontario reef, composed of dead coral, is about 3 cables in length in a west-north-west and east-south-east direction and 1½ cables in breadth, and at half tide a patch of spiral rocks about 20 yards in diameter uncovers. It lies with Serutu lighthouse bearing N. ⅝ E., distant 17 miles, and nearly in mid-channel between the Carimata and Montaran islands.

A patch, with a depth of 5 fathoms over it, lies half a mile northward of the reef with irregular bottom to the distance of a mile, beyond which the depths are from 15 to 22 fathoms all round

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Soundings are no guide in approaching Ontario reef, and the sea does not always break, so it is advisable to give the reef a wide berth. Chart, 2,160 [2,553]. Var. 1° 10′ E.

Florence Adelaide reef, composed of coral and stones, with 1¾ fathoms over it at low water, extends 3 cables in a north-east and south-west direction, with a breadth of 2 cables. At the distance of half a cable eastward there is a sand patch with 6 fathoms water over it; and farther eastward at the distance of 2 miles, depths of 13 and 15 fathoms, over sand, were obtained, with 20 fathoms, mud bottom, close-to; on the north and south sides it is "steep-to," with 17 to 20 fathoms, over sand and mud, at the distance of one mile. No indication of the reef was observed at 2 cables distant. Lat. 2° 4′ S. Long. 108° 5′ E.

THE CARIMATA or KARIMATA ISLANDS lie on the eastern side of the main fairway of Carimata strait, and extend for a distance of about 50 miles south-westward from Maja island on the coast of Borneo.

Carimata, the largest island, is nearly 12 miles in length in an east and west direction, 7 miles in breadth north and south, and near its centre Chabang peak rises to an elevation of 3,378 feet above high water, which, in clear weather, can be seen from a distance of 40 or 50 miles, but as a general rule it is obscured by clouds. On the south-west end of the island are some hot springs. Lat. 1° 36′ 18″ S. Long. 108° 34′ 29″ E.

Reefs extend off the east and south coasts of Carimata from 5 to 7 miles in places, but the north side is comparatively clear.

Besi island, 152 feet above high water, is situated about 4½ miles off shore, on the south side of the reef extending eastward of Carimata island, and has a tower-shaped rock on its flat summit. Isolated reefs extend a further distance of 6 miles eastward and north-eastward of Besi island, the neighbourhood of which should be avoided.

Gravel bank.—About 5½ miles southward of the south point of Carimata island is a gravel bank, having 4 fathoms water over its outer edge, and about midway between this and the west point of Carimata are some rocks with less than 6 feet water over them. Two islets lie off the bay on the west side of Carimata island, with patches of reef between them; the eastern islet is 246 feet and the western 108 feet above high water.

Anchorages.—During the south-east monsoon, there is good anchorage in from 12 to 14 fathoms water, over mud, off the north side of the island, westward of tanjong Senna, the north point. Sailing vessels approaching this anchorage should not stand nearer to the shore than to bring the south point of Buan island in line with tanjong Senna, bearing E. by N. ¼ N., as there are shoals in the bay.

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Chart, 2,160 [2,553]. Var. 1° 15′ E.

During the westerly monsoon there is anchorage, in from 6 to 8 fathoms water, off the south side, north-eastward of Gravel bank, at about 2 miles from the shore; also at about one mile southward of Besi island in a depth of 7 fathoms, over mud.

There is a small village, inhabited by some fishermen, and a few Chinese, in a creek upon the south shore of the island, S.E. by E. from Chabang peak.

Water.—Excellent water may be procured from small streams on the south coast of Carimata.

Lat. 1° 34½′ S. Long. 108° 44½′ E.

Surong Gading island, rocky and 790 feet above high water, lies 3 miles westward of the north-west point of Carimata. A reef extends nearly half a mile southward of it.

Vessels should not use the channels between any of the islands lying between Surong Gading and Carimata island, as there are many reefs among them, and the tidal streams are strong.

Bliang, a round conical island, 1,293 feet above high water, lying between Surong Gading and Carimata, can be seen from a distance of 30 miles or more, and forms a good mark, as it nearly always remains clear when the higher hills are obscured.

A reef, on which there are two wooded islets, extends from the north-east point of the island.

SERUTU ISLAND, about 7 miles in length in an east and west direction, 1½ miles in breadth and 1,575 feet above high water, is hilly with a steep and rocky coast, and should be visible 28 or 30 miles off in clear weather; it forms the north-eastern limit of the main channel of Carimata strait. On the western point of the island is a hummock, which has been mistaken for a small island, and named the Quoin from its appearance. The island is apparently fairly "steep-to" all round.

About 2 miles southward of the east point of the island there is a patch with from 5½ to 7 fathoms water, over mud.

Lat. 8° 48′ S. Long. 108° 41¼′ E.

LIGHT.—On a hill near the west point of Serutu island a *white flashing* light, with a period of system of *five seconds*, is exhibited, at an elevation of 574 feet above high water, from an iron frame-work tower, painted white, and should be visible, in clear weather, from a distance of 30 miles.

Anchorages.—Water.—There is good anchorage off the north side during the south-east monsoon, in about 11 fathoms water. At a sandy beach on the south side of Serutu, and near the east point, there is a good watering place, but high tide is required for a large boat to get

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over a reef, near to which there is anchorage in a depth of 7 fathoms over mud. It is said, also, that fresh water can be obtained at the west end of the island (at the foot of a hill of moderate height), off which a vessel may anchor in 10 fathoms water. Chart, 2,160 [2,553]. Var. 1° 15′ E.

Genting, Mintano, and Gresik are three islands lying in an east and west direction from each other, situated 13½ miles east-south-eastward of Chabang peak. They are 123, 207, and 123 feet, respectively, above high water, thickly wooded, and Mintano, or Mentangor, the centre one, is the largest. A dry sandbank extends 2 cables north-north-westward from Gresik, but there is no other danger, depths of 8 and 9 fathoms, over mud, being found around and between the several islands.

Tongue islands.—Bakong (Pandan), 93 feet above high water and the northern island of the group, is a small wooded hummock with a surrounding reef having three small, wooded islets upon it. About 1¼ miles north-west of Bakong lies a reef, extending 2 miles in a north-north-east and south-south-west direction and having 6 feet least water over it. Lat. 1° 34½′ S. Long. 109° 10¼′ E.

Other detached coral reefs lie between this group and Carimata.

Lising island, 389 feet above high water, is flat, with a reef extending nearly 4 cables south-eastward, upon which are three small wooded islets.

Boom island (Bakung Besar), 236 feet above high water, is a round-shaped, wooded islet, "steep-to" all round.

Steil island (Bakung Kechil), 162 feet above high water and the easternmost of the group, has a reef extending 3 cables north-west of it. A reef about one mile in extent, with 4 fathoms water over it, lies one mile northward of Steil island.

Osterly Channel, the passage between the reefs extending eastward of Carimata island and Lising, is intricate, being obstructed by many shallow patches, between which the tidal streams run with strength. Vessels should not use this channel, but pass eastward of Steil island.

Buan or Pyramid island, the remarkable conical peak of which is 1,017 feet above high water, lies 7 miles north-eastward of Carimata island. A reef extends 4½ cables eastward from the island. Lat. 1° 29′ S. Long. 109° 3½′ E.

Ular and Nibung, 69 and 84 feet above high water, lie respectively W. by N. ½ N., distant one mile and E. by S., three quarters of a mile from Buan island, with channels between them having depths of 8 to 12 fathoms; both these islands are rocky and have a few trees upon them.

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Chart, 2,160 [2,553]. Var. 1° 15′ E.

A shoal with from 4 to 5 fathoms water, over sand, lies 2 cables south-south-eastward of Nibung, and a small reef about 2 cables in diameter, on which are some rocks which dry at low water, lies with Nibung in line with Buan island peak, bearing W. by N., the former island being distant 2 miles. This reef has from 10 to 11 fathoms water round it and generally breaks.

Lat. 1° 24′ S. Long. 108° 51½′ E.

Jamsetjee shoal, composed of coarse sand and stones, has a least known depth of 5 fathoms, and lies with Buan island peak bearing E. by S. $\frac{7}{8}$ S., distant 13 miles, and Bliang peak, S.S.W. $\frac{1}{8}$ W.

Lat. 1° 17′ S. Long. 108° 54½′ E.

Leman islands are a group of rocky islands lying 15 miles north of Carimata island. Pako, the easternmost island, is the largest and 177 feet above high water, with a reef extending to the northward about 6 cables. Budi (103 feet), the western island, has a rounded appearance, and is covered with verdure. Gua and Tikus islands, of this group, are 113 and 74 feet above high water respectively.

Gua and Tukang islands, west-north-westward of Pako, are formed by a reef on which there are stones above water; Tikus has a reef extending 4 cables south-west and 2 cables north-north-eastward of it. Budi is surrounded by a small reef.

The channel between Budi and the eastern islands of the group is one mile wide, with a depth of 14 fathoms; but the channels between the other islands are narrow and obstructed by reefs.

Lat. 1° 5½′ S. Long. 108° 34½′ E.

FAIRWAY SHOALS.—Gwalia shoal is the southernmost of a group of coral shoals extending about 14 miles in a north and south direction, and situated north-westward of the Leman islands. It is a coral patch about 3 cables in length in a north and south direction and 2 cables in breadth, with from 4 to 6 feet on it at low water, from which Bliang island peak bears S.S.E. $\frac{1}{8}$ E. distant 31½ miles. The depths around the shoal are from 7 to 10 fathoms; it does not show by discoloured water, but sometimes breaks slightly.

Erickson shoal, composed of coral and about 3 cables in length in a north and south direction and 2 cables in breadth, with a least depth of 4 fathoms over it, lies about 3 miles north-westward of Gwalia shoal, with depths of from 10 to 12 fathoms at one cable distant; it neither breaks nor shows by discoloured water.

Twilight reef, lying N.E. $\frac{7}{8}$ N., distant nearly 5 miles from Gwalia shoal, has a least depth of 1½ fathoms over it and is 4 cables in length in a north and south direction and 2 cables in breadth. On the east and north sides there are from 7 to 9 fathoms and on the west and south sides 12 to 13 fathoms; it neither breaks nor shows by discoloured water.

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China reef, lying about 6 miles, N. $\frac{7}{8}$ W., from Erickson shoal, is about 5 cables in length, 3 cables in breadth, and the depth of water over it varies from less than 6 feet to 4 fathoms, with from 10 to 14 fathoms around; it is not marked by breakers nor discoloured water. Chart, 2,160 [2,553]. Lat. 0° 57½′ S. Long. 108° 31½′ E Var. 1° 15′ E.

South Greig shoal is a small patch of coral, with 5 fathoms water over it, lying 2 miles northward of China shoal.

Middle Greig shoal, on which the depth is 2 fathoms, is about 2 cables in length, and "steep-to" on the south and west sides, there being 10 to 14 fathoms close to its outer edge; on the north and east sides the depths are more gradual. The shoal does not break nor show by discoloured water, and from it the south peak of Penebangan island bears E.S.E. distant 47½ miles.

North Greig shoal, the northernmost of this group, is a small patch, about a cable in diameter, with 4 fathoms water over it, and 11 to 13 fathoms at the distance of one cable. It is situated 2 miles north-north-eastward of Middle Greig, and 13½ miles N. ¾ W. from Gwalia, the southern shoal of the group. Lat. 0° 52½′ S. Long. 108° 32½′ E.

CAUTION.—The shoals embraced between the Gwalia and North Greig shoals rise from depths of from 10 to 13 fathoms. They are rarely visible either from the deck or mast-head from the green nature of the surrounding bottom, and from the abruptness with which they rise the lead will seldom give sufficient warning to enable a danger to be avoided. Vessels are therefore recommended to give this neighbourhood a wide berth. On the western side of the reefs this may always be secured by keeping in depths of not less than 16 fathoms.

ISLANDS AND DANGERS EASTWARD OF CARIMATA ISLANDS.—Vogelnest (Birds Nest) islands, so named from being the resort of the birds which build the edible nests, are a group of five islands lying 20 miles east-south-eastward of Carimata island; Ajer, the western, and Krawang, the eastern, are 2½ miles apart, and between the latter and the other three, which are named Sumur, Una, and Pelubang, there is a channel 2 miles wide having depths of from 10 to 15 fathoms. The islands are surrounded by reefs extending about 2 cables off, and a large rock, above water, lies N. by E. ¾ E. from Krawang with a coral reef extending beyond it.

Black rocks (Tonkong Perangin) lying 4½ miles south-west of the Vogelnest group and S.E. by E. ¾ E. from Chabang peak, is a dark-coloured, bare rock, 56 feet above high water, with two rocks, also above water, lying on a small reef half a mile south-eastward of it. All these are steep-to, having from 9 to 11 fathoms at a short distance. Lat. 1° 46½′ S. Long. 109° 15½′ E.

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Chart, 2,160 [2,553].
Lat. 1° 39½′ S.
Long. 109° 21½′ E.
Var. 1° 15′ E.

Krawang islets, three in number, are rocky, and lie about 4 miles north-eastward of Vogelnest islands. Papan, the southernmost and largest, is 231 feet, and Machan, about a mile north-west of Papan, 128 feet above high water; Tawas is situated about half a mile north-eastward of Papan. A rock lies 2 cables, W. by S., from Machan, which is the northermost islet. Between Machan and the two other islets there are depths of 12 to 15 fathoms, and between the group and the Vogelnest islands from 9 to 11 fathoms water.

Papan or Laja islands consist of a group of six rocky islands thickly wooded, and divided into two groups of three by a channel about one mile wide.

Lat. 1° 29½′ S.
Long. 108° 23½′ E.

Meledang, the eastern island, is 423 feet above high water and about a mile in length in a north-north-east and south-south-west direction; two islets, the eastern and higher named Bulat, lie northward of Meledang, and from the western a reef extends one cable westward, having a rock on it over which breakers are usually seen.

Of the three islands of the western group the two southern are 4 cables apart in a north-east and south-west direction; from Mensigi, the northern islet, a coral reef, with rocks above water on it, extends westward 4½ cables, and from the southern island a reef extends southward about 3 cables; all the islands are rocky and thickly wooded.

Anchorage.—Meledang affords good anchorage on its east side during westerly winds, having also a convenient landing-place for boats in a small bay near the south extreme.

Rob Roy rock, with a depth of 15 feet over it, lies in Papan channel, with the south extreme of Meledang island bearing S.E. ½ E. distant one mile; it is not more than 80 yards in extent, has from 6 to 12 fathoms water around it, and neither breaks nor shows discoloured water.

Kate or Auckland rock, about one mile westward of Rob Roy rock, is 1½ cables in extent, with 7 feet water over it, and 12 to 14 fathoms, over sand and mud, around. Its position is usually indicated by a ripple.

Tidal streams.—In the channel between Krawang and Papan islands the tidal streams usually set at rates of from 1¼ to 2 knots an hour, during the north-west monsoon in a S. by E., and in the south-east monsoon, in a N.N.W, direction; at the changes of the monsoons the rates are less.

Lat. 1° 24½′ S.
Long. 108° 13½′ E.

Gurong islands are two thickly wooded, rocky islets situated about 10 miles north-westward of Papan islands. They are one cable apart and situated on a coral reef which fringes the islands for a short distance, having from 12 to 14 fathoms, over mud, close-to.

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A rock about 160 yards in extent with 7 feet water over it, and 12 to 14 fathoms around, lies with East Gurong island bearing W. by N. $\frac{5}{8}$ N., distant half a mile. Chart, 2,160 [2,553]. Var. 1° 15′ E.

Landing may be effected on a small sandy beach on the eastern side of the western island.

Tallack reef, of coral, about 160 yards in extent, with 2 fathoms water over it, and from 18 to 20 fathoms close around, lies with East Gurong island, bearing E. by S. $\frac{7}{8}$ S., distant $5\frac{3}{4}$ miles; it neither breaks nor shows by discoloured water, but in calm weather its position may be known by tidal rips. Lat. 1° 22¼′ S. Long. 108° 8¾′ E.

Pelapi islands, situated 7 miles north-westward of the Gurong islands, consist of four high, thickly wooded and rocky islands close to each other; the south-eastern and highest attains an elevation of 1,181 feet above high water, and in clear weather may be seen from distances of from 28 to 32 miles.

Anchorages. — During the easterly monsoon there is good anchorage in from 8 to 9 fathoms water, over mud, midway between the two northern islands; a reef extends 2 cables from the north-east island towards the anchorage. There is a navigable channel between the north-west and south-west islands, but the other channels should not be used.

South-east of the group is an extensive mud flat, affording safe anchorage in from 6 to 7 fathoms during the westerly monsoon.

Water.—On the north coast of the southernmost of these islands there is a small rivulet of fresh water.

Tides.—Springs rise about 6 feet, ordinary tides $3\frac{1}{2}$ to 4 feet.

Suka island, 290 feet above high water, steep, rocky, and thickly wooded, lies 2 miles southward of the western Pelapi island; south-eastward of the island there are depths of from 9 to 10 fathoms over mud, otherwise there is from 18 to 20 fathoms close to the island. Lat. 1° 20½′ N. Long. 108° 7¾′ E.

Double island (Dua), situated half a mile eastward of the north-east Pelapi island, is thickly wooded and has two hills which appear as two islands when seen from a distance. The higher of the two hills is 355 feet above high water. Bulat, a small hummock-shaped islet, lies about a mile west-north-westward of Double island.

Siri island, lying one mile westward of Penebangan island, is 394 feet above high water, with a safe passage of 15 fathoms water between it, and Penebangan. A small, low islet, nearly connected to it by a reef which dries, lies close off the north point of Siri.

Penebangan island, lying north-eastward of the Pelapi islands, is thickly wooded and rises to a peak 1,722 feet above high water. This Lat. 1° 13¾′ S. Long. 108° 15′ E.

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Chart, 2,160 [2,553]. Var. 1° 15′ E.

island lies within the 5-fathoms contour line of a bank, extending westward from Maja island; wild hogs are plentiful and there are a large number of sago palms.

Anchorages.—Anchorage, over muddy bottom, may be obtained nearly all round the island, but, on the south side, where it is fringed by a coral reef, it is not advisable to go inside half a mile of the shore.

There is good anchorage at one mile off the north-western side in from 5½ to 6 fathoms water, over mud, with shelter from southerly winds.

There is good anchorage on the eastern side during the westerly monsoon, but a reef extends from the south point, which should not be approached within half a mile.

Water.—Freshwater bay, on the north side of the island, has two runs of good water; the western is the larger, and here water may be obtained behind a large black rock on the beach; the boats may approach close, or the casks can be landed on the beach, which consists of fine sand. There are four watering places on the west side, all of which are fronted by fine sandy beaches, and easily discerned.

Bulat (Julai) and Burong (Aur) islands lying eastward of Penebangan island, are low and thickly wooded.

Lat. 1° 14′ S. Long. 108° 18¼′ E.

Burung island, is a wooded islet, 64 feet above high water, lying on the shore mudbank, with depths of 3½ to 4 fathoms around; it is a useful mark when navigating the Inner channel.

INNER and GREIG CHANNELS.—The passage eastward of the Papan islands and Penebangan, known as the Inner channel, is used by light draught vessels and coasters when working against the monsoon; the depths are regular, being from 3½ to 4 fathoms, over soft bottom, gradually decreasing to the Borneo coast; the shallow water makes it convenient to anchor at night, or to wait for a favourable tide. (*See* directions, page 581.)

Greig channel, the passage between Penebangan and the Pelapi islands, is 2 miles in width, and free from known danger. The route by this channel and among the islands to the south-eastward, although contracted in some parts, has moderate depths with generally good anchorage; and is, with Inner channel, the only route by which vessels may work against the monsoon, whether bound northward or southward.

WEST COAST OF BORNEO; SAMBAR POINT TO PONTIANAK, WITH THE ADJACENT DANGERS.

GENERAL DESCRIPTION.—Landmarks.—The west coast of Borneo is very low and almost uninhabitable. It is principally composed of a muddy, slimy soil, which at high water, in many parts, becomes a morass.

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There are a few isolated hills, the principal of which, with these heights above high water, are :— Chart, 2,160 [2,553]. Var. 1° 20′ E.

The ridge of small hills from Batu Jarang point, which extends in a north-east direction, has a conical peak 689 feet, and two others which are conspicuous, but not so high. Lat. 2° 35′ S. Long. 110° 12′ E.

Mount Kedio, the highest summit westward of the Kendawangan river, 1,707 feet. Lat. 2° 20¾′ S. Long. 110° 17¾′ E.

Minto mount, 328 feet, on Minto point, in clear weather may be seen from a distance of 20 miles. Lat. 2° 14½′ S. Long. 110° 4¼′ E.

Near Sukadana are the following :— Lat. 1° 19′ S. Long. 110° 11′ E.

Seberuwang, 2,644 feet, has a small pap at the summit.

Palung, a table-topped mountain, 3,704 feet, is 5 miles north-north-westward of Seberuwang.

A mountain southward of Sukadana, 1,800 feet, and southward of it a ridge stretching along the coast, with three conspicuous summits, each in the form of a sugar-loaf.

Northward of Sukadana, a conical shaped hill, 1,752 feet.

Mount Maja, 1,738 feet, on Maja island. Lat. 1° 6′ S. Long. 100° 30½′ E.

Mount Sarat, mount Gadung or Bongkok, and Rumber, are three conspicuous hills on the north side of Maja river; the two first are 755 and 1,100 feet respectively.

Northward of Padang Tikar river is mount Radak, table topped and visible in clear weather from a distance of 24 miles. Lat. 0° 33′ S. Long. 109° 26½′ E.

The Ambawang mountains, with three summits, lie to the northward of the Ambawang river.

Northward of Padang Tikar river, the coast is very low, forming the delta of Great Kapuas river. The tops of the trees, however, are visible from a distance of 12 to 14 miles.

On account of the swampy nature of the west coast of Borneo it is but thinly inhabited; Sukadana is the principal settlement in the southern part of Carimata strait

Coast.—From Sambar point, the low south-west extreme of Borneo, the coast has a general north-north-west direction for about 45 miles to Minto hill, 328 feet above high water, with Kendawangan river lying about midway; thence it trends in a northerly direction, for about 27 miles, to Ketapang river. At 35 miles beyond is Sukadana town and the Simpang river, which lie at the head of a large bay formed between the coast, and Maja island to the westward.

Northward of Maja island several other large islands lie close to the coast, between which are Maja and Padang Tikar rivers; several smaller rivers lie to the northward of them, in the direction of Pontianak. The

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Chart, 2,160 [2,553]. Var. 1° 20′ E.

whole of the coast between Bauwal island, lying about 18 miles north-north-westward of Sambar point, and Pontianak, may be safely navigated by ordinary attention to the lead and chart.

CAUTION.—Numerous detached sand ridges, with little water on them, between which the current sometimes runs from 2 to 3 knots an hour, extend for about 30 miles southward of Sambar point, terminating in Fox shoal. Vessels should pass well to the southward of all these dangers.

Lat. 2° 59¾′ S. Long. 110° 18½′ E.

SAMBAR POINT, or Batu Titi, is low, rocky, and has a large tree upon it, visible about 4 miles farther than the neighbouring wooded land, or about 16 miles; near the point are two wooded islets, and several rocks above water.

Penambung islet, a more or less wooded, rocky reef, lies S.W. by W. ⅓ W., distant 5½ miles from Sambar point; three large trees from a distance appear as three islets.

Mangkap island, situated 7 miles, S.W. ¾ W., of Sambar point, has a remarkable high tree near its centre which may be seen from a distance of about 14 miles in clear weather. A reef covered at high water lies 3½ miles, S.E. ¼ E., a rock above water 2 miles, S.E. by E. ¼ E., of the island, and several others lie north-eastward of it. Vessels from the southward should not attempt to sight this island.

Lat. 3° 30½′ S. Long. 110° 11′ E.

Dangers off Sambar point.—Fox shoal, with a least depth of 2 fathoms over it, is situated with Mangkap island bearing N. ¼ E., distant 26½ miles. The shoal, composed of hard sand, is 2 miles in length in a north-west and south-east direction, and 3 cables in breadth; it does not break, but is indicated by strong ripplings.

About 4 miles south-eastward of Fox shoal is the west extreme of a bank of hard sand, which extends about 5 miles in an E. by S. direction and has depths of from 4 to 7 fathoms over it; this bank is "steep-to" on the south-western and southern sides.

A shoal of hard sand, with 4½ fathoms water over it, lies about 1½ miles southward of the eastern part of the above bank.

Hector bank. — The British Telegraph steamship *Recorder* reported as having in January, 1889, passed over the position formerly assigned to Hector bank (removed from the Admiralty charts in 1885, in consequence of its having been unsuccessfully searched for by one of H.N.M. surveying vessels), and obtained soundings of 7 to 8 fathoms, the extent of the bank being estimated at about 3 miles.

Mr. Madge, the commander, states that on previous occasions, when commanding the British Telegraph steamship *Agnes*, he had passed over Hector bank three times, the least depth then found being 5 fathoms.

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Consequent on the above, Hector bank, with a least depth of 3½ fathoms over it, and 6 to 8 fathoms around, has been replaced on the Admiralty charts in the position originally reported. Chart, 2,160 [2,553]. Lat. 3° 45½′ S. Long. 110° 8½′ E. Var. 1° 20′ E.

Hector bank was also unsuccessfully searched for by H.M. surveying vessel *Egeria*, in October 1890.

Aruba shoal is a narrow bank 4 miles in length, in a north-west and south-east direction, and 4 cables in breadth, with 2 fathoms water over it, "steep-to," and generally indicated by ripplings; its centre lies with Mangkap island bearing N. ⅜ E., distant 23 miles. Lat. 3° 26′ S. Long. 110° 9½′ E.

About 7 miles east-north-eastward of Aruba shoal there is a bank of hard sand, about 2½ miles in length in a north-north-west and south-south-east direction, and half a mile in width, within the 5-fathoms contour line; it has a least depth of 2½ fathoms over it, situated about one mile from its south-eastern extremity, and is "steep-to" on its southern side.

About a mile north-west of the northern extreme of the above bank, and separated from it by a channel, in which the depths are from 6 to 9 fathoms, is the southern edge of a shoal of hard sand, about 4 miles in length in a north-west and south-east direction, and about half a mile in breadth within the 5-fathoms contour line; it has a least depth of 1½ fathoms over it, situated about one mile from its south-east extreme, is "steep-to" on the south-eastern and the middle of its north-eastern sides, and lies S. by W. distant 21 miles from Sambar point.

Clemencia reef, consisting of a ridge of hard sand 4 miles in length, in a north-west and south-east direction, and half a mile in breadth, within the 5-fathoms contour line, and "steep-to," has about one foot water on its shoalest part, from which Mangkap island bears N. by E. ¼ E., distant 20 miles. Breakers are nearly always to be seen on this reef. Lat. 3° 23′ S. Long. 110° 8′ E.

A patch, with a depth of 2¾ fathoms over it, lies 7½ miles N. ½ E., from the shoalest part of Clemencia reef, and one of 3¾ fathoms 6 miles northward of the reef.

Linge shoal, consisting of hard sand, having a depth of 1½ fathoms over it, lies with Mangkap island bearing N.W. ¾ N., distant 13 miles; the shoal is steep upon the northern side, but in other directions the water shallows gradually. Lat. 3° 15′ S. Long. 110° 20′ E.

Banks.—Between Clemencia reef and Mangkap island are several sand ridges extending in a north-west and south-east direction and with shoal spots of 2 to 3 fathoms.

Between these ridges are depths of 6 to 12 fathoms, over mud; as the currents are generally strong with overfalls, and there are no objects by which the position of a vessel may be accurately ascertained, it is advisable, as before mentioned, to pass southward of Fox shoal.

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Chart, 2,160 [2,553].
Lat. 2° 52′ S.
Long. 110° 10½′ S.
Var. 1° 20′ E.

GELAM or Laag island is about 4 miles in extent, very low, thickly wooded, and the largest of a group lying 10 miles north-westward of Sambar point. Penambung Tikus, a group of two wooded islets and some sunken rocks, extend about 3 miles westward of Gelam island, being a continuation of the rocky and foul ground lying between Mangkap and Gelam. Langau and Peranton islets, lying northward of them, are both low and very rocky; Langau, the highest of these islets, may be seen in clear weather from a distance of 14 miles.

A reef, about 4 miles in extent, with a least depth of 1½ fathoms, lies about 6 miles south-westward of Gelam.

BAUWAL or KUMPUL ISLAND, better known among the natives as pulo Bauwal, lies about 6 miles north-north-westward of Gelam island. It is 6 miles in length by 4 miles in breadth, thickly wooded and low, with the exception of two small hills rising above the vegetation near the centre of the island; the west point forms in a bluff when seen from the south-west or southward.

The island was, in former times, the rendezvous for the China convoys in case of separation, and then known as Rendezvous island.

Four islets, in an east and west direction from one another, lie off the northern side of Bauwal, and on reef extending from this side of the island there are several rocks above water, and reefs extend about one mile from the west side; upon the eastern side, banks of hard sand lie parallel with the coast, extending a mile from it, and are "steep-to." Patches of sand and stone, both above and below water, are found within 2 miles of the south side of Bauwal island, and foul ground extends to the Peranton islets.

Lat. 2° 49½′ S.
Long. 110° 1′ E.

Corcyra bank, with a depth of 2 fathoms over it, lies S. by W. ⅔ W., distant about 4½ miles from Sulphur point, with a patch of same depth nearly 2 miles within it. A patch, with 3¾ fathoms water over it, lies South, distant 2¾ miles from Corcyra bank.

The hill over Batu Jurang point, open north-westward of Bauwal island, bearing N.W. ¼ W., leads north-westward of these dangers.

Anchorages.—Sheltered anchorage in both monsoons may be obtained off the east side of Bauwal island; it may be approached by a channel, with depths of about 6 fathoms, between Chempedak and Batu Merah (Red rock), the northern islet upon the reef extending from Bauwal island. Rocks above water extend about 4½ cables eastward of Batu Merah.

There is anchorage off the west side of Bauwal island, which has a sandy beach, in about 5 fathoms water, with Sulphur point bearing about South, and the north extreme E. by N. ½ N., sheltered from easterly winds.

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There appears to be an eddy tide near the island as the rising tide sets to the southward, whereas in the offing it sets north-north-westward. Chart, 2,160 [2,553]. Var. 1° 20′ E.

Water may be obtained on the island by digging above high water mark.

Chempedak, a low, thickly wooded island lying 2 miles north-north-eastward of Bauwal island, and 1½ miles westward of Batu Jurang point, has a rocky coast-line, except on the south east side, where there is a white sandy beach and a small village. The island should not be closed to a less distance than 6 cables upon the seaward side, as many detached dangers exist within that distance. There is a channel between Chempedak and the islands off Batu Jurang point. Lat. 2° 38′ S. Long. 110° 7½′ E.

Batu Jurang is a high rocky point, whence a range of hills, culminating in a conical peak 689 feet above high water, extends in a north-easterly direction, and forms the deep slopes of the southern shore of Kendawangan river, the range terminating about 4 miles from the sea. Two islets, the northern and smaller, named Tengating, and the southern, Iras, lie close off the point and are "steep-to" on their western side.

Between Batu Jurang point and Kendawangan river, a depth of 4 fathoms will be found at about 7 miles from the coast.

KENDAWANGAN RIVER is navigable for small steam vessels beyond the village of Kendawangan, which has a small population of Malays, and is situated 20 miles from the entrance and 4 miles eastward of mount Kedio. The entrance of the river can be distinguished from seaward at about 5 miles distant, and is obstructed by a bar having a depth of 11 feet at low water. Landing is bad during the north-westerly monsoon. Lat. 2° 31½′ S. Long. 110° 12′ E.

Two rocks, dry at low water, named Batu Buaja (Crocodile stone), lie about one mile from the south entrance point of the river, and just north of the fairway. From the south rock the east point of river bears E. by S. ½ S.

The three Kuting Jambu islets and many rocks lie off the north entrance point of the river. Two miles westward of them there is anchorage, in 4 fathoms water, over sand.

Directions.—Steer in with the south point of the river entrance bearing East, and when on the bar a more northerly course may be made for the middle of the river, where the channel between the banks, extending from the entrance points, is most distinguishable. It should not be attempted without local knowledge.

Tides.—The tide at springs rises about 5 feet, neaps 2½ to 3 feet.

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Chart, 2,160 [2,553].
Lat. 2° 20½′ S.
Long. 110° 17½′ E.
Var. 1° 20′ E.

Mount Kedio, 1,707 feet above high water, is the summit of a range of hills extending in a south-westerly direction, westward of Kendawangan river.

Gasei point, 6 miles northward of Kendawangan river, is high and rocky; reefs extend seaward about 3 cables, also in an S.S.E. direction, for one mile. Northward of the point the coast is low and wooded as far as Minto point, and intersected with streams of fresh water.

Sawi island is low, 6 cables in extent, and situated 6 miles southward of Gasei point, at 5 miles off shore. The tops of the trees are visible from a distance of 12 miles, and wooded islets lie about 2 cables off its east and west points.

The western side of Sawi island is steep and rocky with a coral reef extending 2 cables from it, which has from 5 to 6 fathoms close to its extremity. Between the island and the shore there is an intricate channel with a sandy ridge, on which there is a depth of 1½ fathoms, lying across it.

Lat. 2° 19½′ S.
Long. 109° 58½′ E.

Onrust reef, dry about 2 feet at low water, and half a mile in length in a north-west and south-east direction and 2 cables in breadth, lies with Mengkudu rocks bearing N. ⅝ E., and Sawi island S.E. by E. ⅜ E., distant 6 miles. A large rock, with from 2 to 3 feet water over it, lies west-north-west distant 3 cables from Onrust reef.

Mengkudu or Gilbert rock is 33 feet above high water with two trees and sparsely covered with vegetation. Reefs extend from the rock in all directions, that on the south side for nearly half a mile, having depths of from 5 to 9 fathoms close to the edges.

Lat. 2° 14½′ S.
Long. 110° 3¾′ E.

Minto mount and point.—Minto point is a narrow peninsula about 1½ miles in length, with mount Minto, 328 feet above high water, near its extreme, which is visible about 20 miles in clear weather.

Close southward of the point there is a small islet, and northward a reef of rocks and coral extends for a distance of 4 cables.

A coral patch, 3 cables in diameter, on which there is a rock, nearly dry at low water, lies N.N.W. ¾ W. distant 2 miles from Minto point.

Between Minto point and Ketapang river the coast is low and thickly wooded and the ground foul within the depth of 5 fathoms; at 4 miles northward of Minto point is a small, low island named Tjibeh, and a bank of sand extends nearly 3 miles off shore abreast Bereh village.

Pesaguan river.—The entrance to Pesaguan river, where there is a small village, is situated in a bight of the coast, where the shores are low and densely wooded, 13 miles northward of Minto point. The river is about half a cable in width, has a depth of 3 feet over the bar at low water, with from 2 to 3 fathoms water within.

A bank, about 2½ miles in extent, with 4½ fathoms water over it, lies about 3½ miles, W. by S., of the entrance to Pesaguan river.

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PAWAN RIVER.—The Ketapang and Karbau rivers, 3 miles apart, are the two mouths of the Pawan river, and connect about 12 miles above their entrances. The Ketapang has depths at low water of from 1½ to 2 feet over sand; springs rising about 3 feet. Chart, 2,160 [2,553]. Var. 1° 20′ E. Lat. 1° 49½′ S. Long. 109° 55′ E.

The Karbau river has two mouths, one southward the other northward of Adung island; the southern, named Kwala Kandang Kerbo, is about 60 yards in width, with depths of from 1½ to 2 feet, over sand.

The bank, dry in places, fronting the shore to the distance of 2 miles off them, is "steep-to," the depth decreasing suddenly in places from 6 fathoms to one fathom, with a hard bottom. The bars are dangerous during the westerly monsoon.

Beacons.—The channel of Kwala Kandang Kerbo has beacons surmounted by cones on the starboard, and by balls on the port, hand.

Anchorage.—There is a fine weather anchorage for small craft in 3 fathoms water, with tanjong Beras Bassa bearing about S.S.E. ¼ E. and Karbau south point N.E. ¼ E.

Tides.—Springs rise from 5 to 5½ feet; ordinary tides 3 feet.

Tidal streams.—The flood runs with little strength; the ebb from 2 to 2½ knots an hour. The tidal streams set across the beaconed channel.

Coast.—Northward of Pawan river to Chempedak island the coast is low and swampy, and fronted by a mudbank, with depths of less than 3 fathoms, to the distance of 3 or 4 miles; with the exception of a few fishermen it is almost without inhabitants. Chempedak, Sampadian, and Kasaberas are rocky islets with thickly wooded summits, situated on the mudbank about 25 miles north-north-eastward of Beras Bassa point; the passages between them are obstructed by rocks, some of which are wooded.

About 8 miles further north are Perkam and Antu islands, and several rocks above and below water, lying near the coast, where are the three sugar-loaf hills mentioned on page 569.

Juanta islet, rocky and thickly wooded, has a conical peak, 462 feet above high water, which, being visible about 25 miles in clear weather, is useful in the navigation of the locality. Rocks above water lie between Juanta and Katung islets, and also at 1½ miles, E. ¾ S., of the former. Lat. 1° 20′ S. Long. 109° 54′ E.

Katung islet, situated one mile south-west from Juanta islet, is also rocky and thickly wooded, and has a reef lying half a mile north-west of it, which usually breaks.

SUKADANA, 6 miles north-north-eastward of Juanta island, lies on the east side of a large and shallow bay formed eastward of Maja Lat. 1° 14′ S. Long. 109° 57′ E.

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Chart, 2,160 [2,553]. Var. 1° 20′ E.

island, upon the north shore of a small river artificially barred with stones; it is the principal village on this part of the coast. The Dutch Government have a small fort and garrison, but no supplies can be obtained for shipping; the population is about 1,200.

Near the south point of the bay is Salahuama islet, and one mile to the southward of it, close to the coast, Datok islet, is thickly wooded, but not easily distinguished. On the north side of the bay lies Pelintuan islet, small and rocky, and 50 feet above high water.

The whole of this bay is shallow, with channels of slightly deeper water leading to several rivers; the 3-fathoms contour line, fringing Maja island at the distance of 3 miles, stretches across the bay to about the same distance southward of Sukadana, but passing within half a mile southward of Datok island, thence resuming its distance of 3 miles off shore.

The two hills lying north and south of Sukadana, and 1,752 feet and 1,800 feet above high water respectively, are conspicuous objects, and may be seen from a distance of 32 to 36 miles in clear weather.

Beacons.—Two beacons mark the entrance to the river through the dam of stones.

Tide gauges.—There is a tide gauge at Sukadana.

Anchorage.—Vessels may anchor off Sukadana in not less than 3 fathoms water, over soft mud, at about 4 miles W. by S. $\frac{1}{2}$ S. of the flagstaff, but the ground swell renders the anchorage an indifferent one. There is the same depth of water much nearer the shore, off a cliffy point, and about one mile south-south-westward of Datok island, or about 2 miles south of Sukadana, where communication with the shore is easier.

Small craft find shelter from the south-east monsoon in a depth of about 9 feet, over mud, just northward of Salahuama island, and near the south point of Sukadana bay.

Tides.—The tides are diurnal, subject to some irregularity. Springs occur about $1\frac{1}{2}$ days after the time of the moon's greatest north or south declination; in March at about 4 hours in the morning, and becoming 2 hours earlier each month. Springs rise from 5 to 8 feet, the highest tides being in June and December; neaps, rising from 1 to 2 feet, occur at a similar period after the moon has no declination.

Lat. 1° 7′ S. Long. 109° 57′ S.

Simpang river lies at the head of the bight formed by Maja island and the main coast to the south-eastward. Its mouth is obstructed by extensive mud flats; the best approach is near the eastern shore, close to Pelintuan islet, where there is a least depth of 4 feet.

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About 28 miles up the river it forms two branches, and here is the town of Simpang, with about 3,000 inhabitants. Chart, 2,160 [2,553]. Var. 1° 20′ E.

Kumbang and Mendawa rivers.—The mouth of the channel known as Kumbang river, leading from the southward, between Maja island and the Borneo coast, to Simpang Lida river, is 3 miles wide abreast Kumbang island on the east side of its entrance; it is fronted by a bar about 5 miles wide, composed of soft mud, over which a depth of about 10 feet may be carried at ordinary low water, with local knowledge, but at springs only from 7 to 8 feet. Within Turun point, on the west side of the entrance, the depth increases to 5 and 7 fathoms, but above Paduan river it decreases to 3¾ fathoms. Lat. 1° 8′ S. Long. 109° 47¼′ E.

At the north-east extreme of Maja island it connects with Maja river, and the united streams under the name of Simpang Lida river continue for 6 miles to the entrance of Mendawa river, and its junction with Padang Tikar. The Mendawa connects with Kapuas river. Vessels from 6 to 9 feet draught can navigate to Pontianak from the Kumbang river, a distance of about 140 miles, by these channels.

Beacons.—From the mouth of the Kumbang river the channel is marked, on the starboard side, by beacons surmounted by cones, and on the port side by beacons surmounted by balls.

Tides.—Springs rise from 6 to 7 feet; ordinary tides 3½ to 4 feet.

MAJA ISLAND fronts the Borneo coast north-eastward of Carimata island, and separates the Maja river from the Kumbang. It is about 26 miles in length, in a north-east and south-west direction, and about 18 miles in extreme breadth. Mount Maja, on its western side, is 1,738 feet, and mount Marang or Berantak near its south extreme is 329 feet above high water; the remainder of the island is low. Its south-west extreme is covered with tall casuarina trees, and fronted by a bank with 3 fathoms and less to the distance of 3 to 5 miles, increasing off the north-westward side of the island to about 7 miles.

Depths of less than 5 fathoms extend nearly 10 miles south-westward of the island, to within 3 miles of Meleidung island.

Maja river has a least depth of 2¾ fathoms on the bar situated about midway between Penebangan island and the north-west extreme of Maja island; within the bar it deepens to 4 to 7 fathoms, and connects with the Kumbang and Simpang Lida rivers at the north-east extreme of Maja island, as before mentioned.

Antu, a small rocky island thickly wooded on the summit, lies just within the 3-fathoms contour line in the approach to Maja river; it forms Lat. 1° 3¾′ S. Long. 109° 18¼′ E.

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Chart, 2,160 [2,553]. Var. 1° 20′ E.

a useful mark for vessels bound to that river, being visible in clear weather from a distance of 12 miles.

Lat. 0° 57′ S. Long. 109° 15½′ E.

Masien Tiga islands are two thickly wooded islands situated north-north-westward of Antu island, and 4 miles from the coast of Borneo; the larger island is 394 feet above high water and visible from a distance of 20 miles in clear weather. Nanas and Malang Merakit or Dua are small wooded islets lying one mile off shore, eastward of Masien Tiga islets; Nanas is 197 feet above high water.

Directions.—To enter, steer for mount Maja bearing E. by N. until Antu island is in line with the western Masien Tinga island, N.N.W. ⅜ W., when steer N.E. ⅓ N. over the bar and passing about 1½ miles off the north-west extreme of Maja island, and northward of the bank which extends about 3 miles north-eastward of that extreme, continue towards the narrow portion of the river, which is about half a mile wide bordered by shelving mudbanks. *See* remarks on the Kumbang, page 577.

Vessels of less than 12 feet draught can cross the flat between Antu and Masien Tiga islands, keeping a look-out for snags which at times obstruct this passage.

Coast.—From Maja river northward to Padang Tikar the coast is low and fronted with extensive banks of sand and mud; vessels should not approach the coast nearer than 8 miles, or bring Penebangan summit to bear southward of S. by E. ¾ E.

PADANG TIKAR RIVER, situated about 20 miles northward of Masien Tiga islands, is the deepest river on the west coast of Borneo, having a depth of 3½ fathoms over the bar at low water over a breadth of one mile, and a depth of 3 fathoms over a breadth of 3 miles. Vessels of 12 feet draught can reach Pontianak from Padang Tikar by proceeding southward of Panjang island, and thence by Jenu and Mendawa rivers to the Great Kapuas, but local knowledge is necessary. Little Kubu river, on the east side of the entrance to Padang Tikar, admits vessels of about 10 feet draught at high water.

Lat. 0° 35′ S. Long. 109° 20′ E.

Buoys.—A conical buoy, painted black and surmounted by a staff and ball, is moored immediately outside the 5-fathoms contour line, at the entrance to the river, with the tallest tree on Padang Tikar point bearing E. ⅜ S., distant 10¾ miles.

On the southern edge of the bank on the north side of the river a can buoy, painted black, is moored with the tree on Padang Tikar bearing S.S.W. ⅞ W., distant about 2 miles.

A conical buoy, painted white and surmounted by a ball, is moored on the starboard side, and a can buoy, painted black, on the port hand, at the entrance to Little Kubu river.

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Chart, 2,160 [2,553].
Lat. 0° 33′ S.
Long. 109° 26½′ E.
Var. 1° 20′ E.

Directions.—The high trees on Padang Tikar point may be seen from a distance of about 12 miles. Radak mount, an isolated table top, about 12 miles north-eastward of Padang Tikar point, is visible about 22 miles, and will be seen about the same time as the point in clear weather.

In entering the river, steer for Padang Tikar point, bearing E. ¼ S., which should lead to the buoy off the entrance and over the bar in 3½ fathoms water, the shoalest part being about 8 miles westward of the point. When Radak mount comes in line with Burung islet (the south-eastern islet on the north side of the river), bearing N.E. by E. ¾ E., steer for it until Padang Tikar point bears about S.E. ¾ S.; when edge to the eastward to bring Radak mount in line with Terjun hill (a low rocky hill with two conspicuous trees on its summit on north side of entrance to Radak river) bearing N.E. by E. ¼ E. These objects in line being steered for, lead in the fairway in from 6 to 7 fathoms water, between Burung islet and the flat extending westward of Panjang island. When the west point of Little Kubu river bears N.N.W., anchor in about 7 fathoms water on the leading mark.

Vessels of 10 feet draught can enter Little Kubu river under favourable circumstances at high water, by steering for the west point of entrance bearing N.N.W.; the depth on the bar at high water being 9 feet in the south-easterly monsoon, 12 feet in the north-westerly monsoon, and 6 feet at low water.

Proceeding up the Padang Tikar, and having the point of that name bearing about S.S.E., steer to the eastward and south-eastward, at about half a mile from the south bank, in depths of 5 to 7 fathoms as far as the east end of Panjang island; above this local knowledge is necessary.

Tides.—In the south-east monsoon it is high water, approximately, at Padang Tikar river about 8h. 30m p.m.; and in the north-west monsoon about the same time in the morning. The rise and fall of tide at springs is from 3 to 4 feet in the former, and about 6 feet in the latter. Off the coast the flood runs about S.S.E. and the ebb N.N.W.

Coast.—From Padang Tikar river to Little Kapuas river, at about 40 miles to the northward, and on which is the settlement of Pontianak, the coast is low, marshy, and broken into several islands by the shallow streams forming the delta of Great Kapuas river, the principal of which is the Membawang with a depth of 6 feet at low water.

The Ambawang mountains, situated about 14 miles northward of Padang Tikar river, rise from this low coast, and may be seen in clear weather from a distance of 36 miles, and are therefore visible from Pontianak road. The shore is fronted by a mudbank to the distance of

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Chart, 2,160 [2,553]. Var. 1° 5′ E.

2 to 3 miles with depths of less than 3 fathoms, which may be approached by the lead. For Pontianak, *see* Vol. II.

DIRECTIONS.—Carimata strait from the southward.—Approaching Carimata strait from the southward, a vessel will have to depend principally upon the correctness of the reckoning, for the depths are so irregular that they will afford but imperfect guidance, and the land is too distant to be of service in determining a position.

Lat. 3° 47′ S. Long. 108° 4½′ E.

If to the westward of longitude 108° 20′ E., a good look-out should be kept to sight Kebatu or Shoe island (page 552), which, if seen, will determine the position; thence course may be shaped for the strait, either by the main route eastward of Ayer Masin, Discovery reef, Karang Juruk, Karang Batuan, and Cirencester shoal; or by the route westward of those dangers, between them and the Osterly shoals, avoiding Bower shoal.

Passing to the eastward of the above reef, the lighthouse or light on Discovery East bank should be a guide.

Should the vessel be to the eastward of 109° 30′ E, and approaching the parallel of 4° S., care must be observed to keep to the westward of the dangers which, including Hector bank, extend about 40 miles southward from Mangkap island, which island should on no account be sighted until it is known to bear eastward of N.E.

Having passed Bauwal or Kumpul island, a course should be shaped to pass eastward of Ontario reef, dry at half tide, between which and Black rocks there are no known dangers; Carimata, Serutu lighthouse, and the adjacent islands affording good objects for determining the position.

Vessels may pass westward of Ontario reef, between it and Montaran islands, avoiding Flying Fish reef, which lies nearly 14 miles southward of it; Condor reef, with a depth of 2½ fathoms, situated about 7 miles northward of those islands, and Florence Adelaide reef to the north-westward. The passage eastward of Ontario reef is to be preferred.

Having brought Serutu island to bear East, distant about 5 miles, course may be shaped as requisite, observing that Chabang peak on Carimata island kept eastward of S.E., or Serutu summit eastward of S.S.E. ½ E., leads westward of Gwalia reef and the reefs northward of it.

Vessels passing northward through Carimata strait during the months of December, January, and February (the strength of the north-west monsoon) generally keep near the coast of Borneo to avoid the strong southerly current, and pass into the China sea through Greig channel or Inner channels; directions, page 581.

See remarks on pilots, page 544. China sea continued in Vol. II.

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From the northward, during the north-west monsoon, the channel eastward of Ontario reef should be taken. Approach Serutu island lighthouse between the bearings of S.E. and S.E. by E., passing 4 or 5 miles westward of it, observing that the west extreme of the island kept westward of N. ½ W. leads eastward of Ontario reef. Thence the peak of that island may be gradually brought to bear N.W. by N., astern, until lost sight of, which direction being preserved leads well to the eastward of Catherine reef. (If passing westward of Ontario reef, avoid Flying Fish and Condor reefs lying between it and Montaran islands.)

Chart, 2,160 [2,553]. Var. 1° 5′ E. Lat. 1° 43′ S. Long. 108° 41½′ E.

From a position 10 miles eastward of Catherine reef, a S.S.E. course should lead in the fairway, and about 15 miles eastward of Discovery East bank, clear of all dangers.

From the northward, when the south-east monsoon is strong, vessels get smoother water and less current in Greig and Inner channels.

In thick weather, and not certain of the position of the vessel, the best way is to borrow towards the Borneo coast, to get a sight of the land if circumstances admit, and take a new departure from Bauwal island, avoiding the shoals extending 30 miles southward of Mangkap island.

Inner and Greig channel.—Vessels working through Carimata strait have to take either the Inner channel, or Greig channel, eastward of Carimata islands, the main strait being impracticable on account of the strong adverse current. In these channels the sea is smoother and the current not so strong, it being wholly or in part overcome by the tidal stream and the indraught into the rivers on the west coast of Borneo; vessels also have the advantage of the change of wind at night and in the morning caused by the land breeze, and which often brings it several points more to the eastward in both monsoons.

These channels (page 568) have a convenient depth for anchoring, with a bottom of soft mud, but working through them is slow and tedious, and, as an instance of this, H.N.M. surveying vessel *Hydrograaf*, when employed there, had a vessel, that was working through, in sight for eight days.

As before remarked, page 544, the flood stream comes from both northward and southward on this coast, meeting off Sukadana, the ebb going in the contrary directions.

From the southward.—Being northward of the dangers off Mangkap island and of mount Minto, the Borneo coast may be approached to 9 or 8 fathoms water, and to 7 or 6 fathoms when nearing the Papan island. The Black rocks and Vogelnest islands should not be approached nearer than one mile. A vessel may pass on either side of the Papan

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Chart, 2,160 [2,553]. Var. 1° 5′ E.

islands, observing that the water quickly shoals to 5 fathoms, at 3 miles north-eastward of Meleidung, the easternmost of the group. The western side is clear.

Between Krawang islets and the Papan islands the depths are from 12 to 13 fathoms, decreasing fairly regularly towards the Borneo coast; and between Papan, and Gurong or Passage islands, there are from 11 to 12 fathoms. North-eastward of the Gurong islands the depths decrease rather suddenly from 8 to 5 fathoms, but gradually under that depth. Greig channel is bold towards either shore with depths from 12 to 16 fathoms in the fairway.

Between Penebangan and Masien Tiga islands, the Borneo coast may be approached to 6 fathoms, but when northward of Masien Tiga do not bring that island to bear southward of S.E., or stand into less than 8 fathoms water, until off Padang Tikar river, northward of which the coast may be approached to within 4 miles.

A vessel may stand off to, or westward of, the Leman islands. observing that those islands (in sight from aloft) kept southward of S.E. by S., lead eastward of Twilight reef and of the reefs westward of it.

From the northward.—In the south-east monsoon, steam vessels from Pontianak, or from that direction, make use of Greig channel, thence passing eastward of Meleidung island, and down the Borneo coast, distant about 10 miles. From abreast Bauwal or Kumpul island, a good departure may be taken to avoid the shoals southward of it, and a vessel will be well to windward.

With the chart now published the navigator will have more confidence, and may probably find it convenient at times to venture amongst some of the islets, but it must be borne in mind that in those channels the current is invariably stronger and more erratic.

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CHAPTER X.

OUTER ROUTE FROM BANKA STRAIT TO SINGAPORE.

OUTER ROUTE.—Vessels bound from Banka strait to Singapore seldom adopt the Outer route to the eastward of the islands of Linga and Bintang, most vessels preferring to proceed by Rhio strait; it, however, forms part of the main route into the China sea, and is, therefore, of importance. Chart, 2,757 [2,554]. Var. 1° 10′ E.

Tidal streams.—Between tanjong Kalian, the Rhio and Linga archipelagos and Singapore the average rate of the tidal streams, in the S.S.E. monsoon, is greater than in the north monsoon on account of the prevalent S.S.E. winds; nevertheless, in the latter monsoon greater rates have been observed than in the former.

The greatest rate observed in the north monsoon was 2 knots an hour and, in the S.S.E. monsoon, fully 1¼ knots, whereas the average rates, on the contrary, were half a knot and fully three-quarters of a knot, respectively.

The COAST of SUMATRA from Batakarang point (page 466) trends north-north-westward for about 67 miles to tanjong Jabong. The entire coast is very low, covered with wood, but little known, and fronted by a mudbank that, within a depth of 5 fathoms in places, extends about 13 miles off shore. It may be approached to a depth of 5 fathoms, except off tanjong Jabong, about 1½ miles off which there are in some places from 7 to 8 fathoms. Vessels bound to Berhala strait, when approaching tanjong Jabong, should keep about 8 miles off shore until it bears West.

TUJU or Seven islands lie in the north-east approach to Banka strait, and about 20 miles from the north coast of Banka island. They are high, wooded, uninhabited, and visible from a distance of about 25 miles; there are several off-lying reefs. Coasters occasionally visit the islands for the purpose of obtaining wood and water; the water, which is bad and scarce, is procured on the west side of Katjangan, where there are wells.

Ju or Round island, the southernmost of the islands, is small, but rises to a height of 270 feet above high water. Sato, the westernmost of the islands, is also small, 105 feet above high water, and lies about 4 miles north-west from Ju. Between these, are Meranti island, 117 feet above high water, and Lalang; and midway between Sato and Meranti there is a reef, with a depth of 20 feet over it, and from 11 to 14 fathoms around. All these islets have fringing reefs. Chebia, the largest island of the Lat 1° 16½′ S. Long. 105° 16½′ E.

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Chart, 2,597 [2,561]. Var. 1° 10′ E.

southern group, is about one mile in extent, 373 feet above high water, and surrounded by a reef which projects a little more than a mile from its east extreme.

Katjangan, the north-easternmost and largest of the Tuju islands, is 2½ miles in length by half a mile in breadth, with several peaks, the highest of which is 526 feet above high water. It is surrounded by a reef, on which are some rocks above water. About 2¾ miles westward from its north-west extreme, is Tukonkembang, a small islet, 120 feet above high water, surrounded by a reef. About one mile westward from Tukonkembang, is North-west rock above water, with a small fringing reef.

Chart, 1,789 [2,531]. Lat. 0° 57¾′ S. Long. 105° 38¾′ E.

DOKAN or MENALI ISLAND, 300 feet above high water, lies about 24 miles north-eastward of the Tuju group; it is about three-quarters of a mile in extent, and surrounded by a reef, on which are a small islet and some rocks nearly one mile from its north-eastern extreme. The summit of this island is sharp when seen from the northward, but appears round when approaching from the eastward; it should be seen in clear weather from distances of 32 to 36 miles.

Mary rock.—Three reefs extend 1½ miles in a S. by E. direction from the south point of Dokan. Mary rock, the outer one, has a depth of 6 feet over it, and is distant 1½ miles; the middle rock has 10 feet, and the inner one 5 feet, distant about three-quarters of a mile from the point. The depths around them are from 12 to 18 fathoms.

The channel between Tuju and Dokan islands has depths of from 12 to 16 fathoms.

Lat. 0° 54½′ S. Long. 105° 45½′ E.

TOTY ISLAND or pulo Laut, 250 feet above high water, lies 8 miles, N.E. by E ⅔ E., from Dokan island. It is small, and surrounded by a reef, which on the north-west side projects half a mile. The summit of this island when seen from the northward appears round, but sharp from the eastward.

The passage between Toty and Dokan appears to be free from danger, and the depths in it are from 12 to 18 fathoms.

Directions. — When passing between Banka and Tuju islands, the latter should not be approached to less than 13 fathoms water, nor Banka island nearer than 5 miles, for its dangers are all about 3 miles in the offing, and some of them nearly awash. Near the Malan Hyu and Malan Doyang rocks the bottom is rocky, and the depths irregular.

Vessels keeping to the southward of Toty and Dokan islands, in order to cross over to Borneo, must take care to avoid Mary rock, already mentioned, also Vegas reef and other dangers described at page 538.

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Between the north coast of Banka and Tuju, Dokan, and Toty islands the general depths are from 14 to 16 fathoms, but more to the eastward they increase to 18 and 20 fathoms. Chart, 1,789 [2,531]. Var. 1° 10′ E.

Currents.—From October to March, during the north-west monsoon, the currents set strongly to the south-east, and during the other months to the north-west. It has, however, occurred that vessels going to Banka in June and July have experienced strong southerly currents.

SAYA ISLAND (Taya), situated about 31 miles north-westward of Katjangan island, is "steep-to," of granite formation, covered with wood, uninhabited, and rises to a double peak 689 feet above high water; the northern peak is about 60 feet less in elevation than the southern one, and both peaks are in line on a N. by E. ½ E. and S. by W. ½ W. bearing. Two sandy bays are formed in the bight between the hills, and there are two small islets off its north-east side. The Niamok islets, formed of granite, steep and wooded, lie 5 and 8 cables northward of Saya island. Lat. 0° 46¾′ N. Long. 104° 55¾′ E.

Water.—There is a spring of good water on the western side of Saya island during the north-west monsoon or wet season, and a boat, at high water, can approach it to within 40 feet, but, at low water, rocks extend nearly a cable beyond the sand. The knowledge of this may be important to the mariner, as no similar facility for watering occurs between Banka and Rhio strait. In the dry season, from about June to August, the spring is at times virtually dry, though enough water is collected in mud holes to supply the Malays who camp here for fishing.

Castor bank is a ridge with a hard sandy bottom, 9½ miles in length in a N.E. by N. and S.W. by S. direction, and about one quarter to half a mile in breadth, except at the southern end, where it widens to about 3 miles.

The depths on it range from 7 to 9 fathoms, but there are two patches, with barely 6 fathoms water over them, lying N.E. ¼ E. distant $6\frac{*}{10}$ and 8½ miles respectively from the south peak of Saya island. The north and east sides of the bank are fairly steep, there being from 15 to 16 fathoms close to; on the western side it drops gradually to 13 fathoms. The bank is famous for a red species of fish, named Ikan Merah, from their colour.

Saya island, bearing S.W. by S., will lead about one mile to the westward.

Cowman's bank.—To the westward of Castor bank, and to the northward of Saya island, is a narrow bank of hard sand and shells, with here and there mud, known as Cowman's bank. It is $7\frac{7}{10}$ miles long in a N.E. and S.W. direction, and has a breadth of from one quarter to three quarters of a mile; the least water is 6½ fathoms, which place is situated North, distant 9¼ miles from the south peak of Saya island.

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Chart, 1,789 [2,531]. Var. 1° 10′ E.

The northern and eastern sides of this bank are the steepest, the former having 18 fathoms close-to.

Between Cowman's bank and Ilchester bank, and separated from the latter by a channel about a mile in width, with depths of 13 to 17 fathoms, is a bank with a bottom of sand and shells, $4\frac{2}{10}$ miles in length in a N.E. by E. and S.W. by W. direction, and from one-half to three-quarters of a mile in breadth.

Lat. 0° 30½′ S. Long. 104° 56½′ E.

The shoalest spot is 5 fathoms, which lies North, distant $16\frac{6}{10}$ miles from the south peak of Saya island.

Ilchester bank (Alang Kalem) is 2½ miles in length in a north-east and south-west direction, within a depth of 3 fathoms; from half a mile to 1¼ miles in breadth, and "steep-to," with a least depth of 1½ fathoms on two heads, near its south-western side.

From the centre of the bank, tanjong Jang lighthouse bears N. ⅝ E., distant 8¼ miles. Saya island, bearing S. by W. ½ W., leads nearly 3 miles eastward of the bank.

SINGKEP ISLAND, pulo Penuba, and two islands to the westward appear from a distance like one large island, being separated only by narrow channels. They lie off the south-western part of Linga, and, together with some adjoining islets and shoal spots, cover a space from 20 to 24 miles in extent.

Singkep, the largest island of the group, is of irregular shape and of considerable elevation, having on its north-eastern side a range of hills, the highest peak of which is mount Lanjut, 1,688 feet above high water; the remaining portion is low, with here and there an isolated hill.

Lat. 0° 25½′ S. Long. 104° 30¾′ E.

It is only the east and north-east coasts of Singkep and the dangers off them which will be noticed here; the other portions of the group belong to the Inner route, by Berhala and Durian straits, and are described at page 631.

East Coast.—From tanjong Malang, the south-east point of the island, the coast has a north-east direction for 12 miles to tanjong Tija, and at 9½ miles is Dabok, the chief establishment of the Singkep Tin Company, from which the tin from the island is exported; here there is a landing stage about a quarter of a mile in length.

Dangers.—A shoal, about 1½ miles in length, in a north-north-east and south-south-west direction, has 2 fathoms water over its southern part, from which tanjong Malang bears W.N.W., distant 2¾ miles. About a mile to the eastward of this bank is the south extreme of a shoal which stretches 5 miles in a north-east direction within the 3-fathoms contour line, with a breadth of about a mile and a least depth of 1¼ fathoms over it. From the northern extreme of this shoal there are depths of less than 5 fathoms for a distance of nearly 3 miles in a north-east direction.

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Tanjong Buku, the south-west point of Singkep island, bearing West, leads one mile southward of this danger. Chart, 1.789 [2,531]. Var. 1° 10′ E.

At tanjong Tija, the east point of the island, the 5-fathoms contour line is distant about 1½ miles from it, but northward of the point an extensive bank extends from the shore of the island, and the 5-fathoms limit is distant 5½ miles in a north-east direction from tanjong Tija. About 5 miles northward of tanjong Tija lies a bank nearly 4 miles in length, in an east and west direction, with depths of from 1½ to 2¾ fathoms over it; its eastern edge is about 5 miles from the shore. Lat. 0° 28′ S. Long. 104° 36′ E.

LINGA ISLAND, lying about midway between Banka and Singapore strait, is about 35 miles in length, in a north-west and south-east direction. The northern portion of the island is hilly, some of the hills being about 700 feet, and at its south-west part is Linga peak, a remarkable mountain, attaining an elevation of 3,957 feet above high water, and split in two, which Horsburgh describes as "two peaks rising like spires from the summit of the mountain"; it is visible from a considerable distance in clear weather.

North-eastward of Linga peak is mount Sepinchan, 3,371 feet above high water, and on its eastern slope is Batu Gaja, the eastern side of which may be known by it having a grey Y-shaped patch.

Daik, the principal town, is situated by the river of the same name, on the south coast.

Tanjong Jang, the east extreme of Linga, from its prominent position and pyramidal peak, 565 feet above high water on its northern side, is conspicuous and visible in clear weather from a distance of about 30 miles. Tanjong Goro, the south point of the island, may be known by a saddle hill, 630 feet above high water, near it. These points make like islands when above 13 miles distant.

LIGHT.—On tanjong Jang an iron frame structure exhibits, at an elevation of 184 feet above high water, a *white group flashing* light, with a period of system of *thirty seconds*, which shows *two flashes* in quick succession, each of *two seconds* duration, with eclipses occupying *two* and *twenty-four* seconds. Lat. 0° 18¼′ S. Long. 105° 0′ E.

The light should be visible, in clear weather, from a distance of 20 miles, between the bearings of S. 6° E., through south, to N. 63° E., excepting when in line with Selentang island, pulo Kakau and pulo Sunsa. There is a stone dwelling near the light structure.

Islets.—Rocks.—Merali islet, an islet lying 1¼ miles eastward of the lighthouse on tanjong Jang, is surrounded by a reef, and nearly midway between it and the point there is a rock with 1¾ fathoms water over it.

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Chart, 1,789 [2,531].
Lat. 0° 19′ S.
Long. 104° 59½′ E.
Var. 1° E.

Sunsa islet, about half a mile southward of the lighthouse, has on it a hill, 335 feet above high water; a small wooded rock lies close westward, and 7 cables west-south-west of the islet there is a rock almost awash at low water.

Between tanjong Jang and tanjong Goro is a deep, shallow bight named Tolo bay, on the western side of entrance to which is the Kakau, a small, hilly islet; 3 cables to the southward of the islet is Batu Mareso, a rock just above high water.

Batu Kapal, or De Hes rock, with 6 feet water over it, lies 2 miles off shore, with tanjong Goro bearing E. by N. ⅛ N. distant 3 miles; it shows by tidal rips. The south extreme of Sunsa islet open southward of Kakau islet, bearing E.N.E., leads southward of it, and Linga peak N.W. by W. ½ W. leads westward.

From tanjong Goro the 5-fathoms contour line has a west-north-west direction for 17 miles to Mengalang island, wooded and surrounded by a reef which extends a mile from its eastern side. Busing and Burung are two islets lying, close to the shore, about 10 miles west-north-westward of tanjong Goro and south-south-westward of these islands the 5-fathoms contour line is 3 miles from the shore; inside it to the eastward there are no dangers, the depths decreasing gradually to the shore.

LINGA ROAD.—The bay forming Linga road is exposed to southerly and easterly winds, and large vessels are obliged to lie far out on account of shallow water extending from the mouth of the river, and around Kelombok islet and its adjoining islets.

Lat. 0° 16¾′ S.
Long. 104° 38′ E.

Isles.—Reefs.—Kelombok islet, the largest of these islets, with Hantu and Badas, are in great part surrounded by reefs, dry at low water, lying on a ridge, with less than 3 fathoms water over it, which extends to a reef, which dries in two places, and lies 8 cables southward of tanjong Bliung, a distance of 8 miles from Hantu islet.

Between tanjong Bliung and this ridge there is a channel, with a depth of more than 5 fathoms, which has an easterly direction between Mepar and Badas islets and northward of Kelombok islet.

Mepar, with a village on its north side, lies about one mile northward of Badas, and is on a reef drying at low water which, extending to tanjong Bliung, forms the northern side of the above channel. A small reef, with one fathom water over it, is situated 3 cables southward of Mepar islet; another rock, with one foot water over it, lies in the channel between Badas and Kelombok islets.

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Southward of these islets lie several rocky patches with from $2\frac{1}{4}$ to $4\frac{3}{4}$ fathoms water over them; their positions will be best seen from the Admiralty chart. Chart, 1,789 [2,531]. Var. 1° 0′ E.

Town.—Diak, the principal town, is prettily situated on the banks, and nearly one mile within the entrance of the fresh-water river of the same name. The high, rugged, fantastic peak of Linga in the background, together with the appearance of the country boats all moored to cocoa-nut trees and areca palms, their rich foliage almost obscuring the houses, give to the whole a picturesque appearance. Lat. 0° 13½′ S. Long. 104° 37¾′ E.

The river is not more than 100 feet wide, and will only admit small vessels, as its bar dries at low water, spring tides. Both sides near the entrance are densely wooded, and alligators are numerous.

Population.—Trade.—The town contains about 6,000 inhabitants, Malays and Chinese. The former prefer their usual style of houses constructed on poles, but some of the Chinese have substantial buildings of stone. The produce is rattans, pepper, and gambier, which is carried to Singapore and Rhio principally by native craft. Gold is found in small quantities after heavy rains. Tin has not yet been found, but the neighbouring island of Singkep produces some. The Sultan is nominally under Dutch protection.

In the year 1896, 193 steam vessels entered the port.

Water.—There is a well of good water on Mepar islet, but the shore is bordered by a reef, which makes watering difficult except from half flood to half ebb. There is also a well near the town.

Anchorage.—There is anchorage in Linga road in 4 fathoms water, over mud, with Badas islet bearing N.N.E. about one mile, and Penuba peak, W. ½ S. There appears to be good anchorage eastward of the islets, in about 7 fathoms, and 4 miles off shore, with Linga peak just eastward of Kelombok islet, bearing N.W ¾ W., and Mount Lanjut S.W. by W.

Directions.—A vessel proceeding towards Linga road from Banka strait should pass westward of Saya island, and steer for the high land to the eastward of Linga peak, giving the eastern coast of Singkep a berth of at least 5 or 6 miles.

In working, by not bringing tanjong Tija, the east point of Singkep, to the northward of N.W. by N., will avoid the shoal off the south-east side of that island; and by not bringing the same point to the southward of S.W. until Linga peak bears N.W. by N., will avoid the shoal bank which extends 4 miles in a north-easterly direction from the north-east side of Singkep.

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Chart, 1,789 [2,531]. Var. 1° 10′ E.

When standing towards the south coast of Linga, Batu Kapal, which is "steep-to," will be avoided by keeping the south extreme of Sunsa islet open of Kakau islet, bearing E.N.E., or Linga peak northward of N.W. by W. ½ W.

Bound to Linga road from the north-eastward, round the east point of Linga island at a moderate distance, and then steer to the westward for the anchorage.

Tides.—The tides at tanjong Butun are diurnal, subject to irregularities.

It is high water at about 9h. in the forenoon on 1st January, and about two hours earlier in each of the following months; springs occur about 3 days after the moon's greatest declination, with a rise of 7 feet, and neaps, at a similar period after the moon has no declination, with a rise of one foot.

About the second half of June and December, springs rise 8½ feet, and neaps 2½ feet, and about the same time in March and September springs rise 5½ feet, with no perceptible rise at neaps.

During the semi-diurnal tides, springs occur 3½ days after full and change, with high water at 4h. and a rise of 2 feet; neaps happen at a similar period after the moon's quadratures, with high water at 10h., the rise amounting to one foot in the second half of June and of December, and being imperceptible in the second halves of March and September.

Tidal streams.—The flood runs to the westward at the rate of 2 knots an hour.

COAST.—The North-east coast of Linga is formed of numerous hillocks, from 200 to 300 feet above high water, which gives it a uniform appearance, and neither it nor the adjacent islets are safe to approach at night.

Lat. 0° 7¾′ S. Long. 104° 49¼′ E.

Limbung bay.—About 15 miles north-westward of tanjong Jang is Hantu islet, low, sandy and wooded, which has a reef, generally dry and with rocks showing at high water, extending north-eastward of it for a distance of 3 cables; it is situated off the south point of Limbung bay, a deep, shallow indentation.

Three rocks, drying at low water, lie from 8 cables to $1\frac{1}{10}$ miles west-south-westward of the islet.

The shores of the bay are low, with a sandy beach, and covered with vegetation; the bottom, over the greatest portion of the bay, is mud. There are several Chinese settlements, and, on the west side, Limbung village.

The bay contains several islets and dangers; in the southern portion are Telom, Seranggas, Barok, and Kekék, low, wooded islets, with half a

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mile north-north-west of the latter a drying reef, and on the western side there are other islets and reefs. Chart, 1,789 [2,531]. Var. 1° 10′ E.

Ujung Beting island, nearly 4 miles in length and the largest in the bay, has tolerably steep hills on its east side, which slope towards the west; on its south-west side, where a reef extends half a mile, there is a cocoa-nut plantation.

Hitam islet lies eastward of Ujung Beting island and is connected to it by a reef; on the north-east side of the latter island is a reef extending 6 cables, and a rock which dries at low water. Lat. 0° 7¾′ S. Long. 104° 46½′ E.

Three miles north-eastward of Hitam islet and within the 3-fathoms limit is Empo islet, low, sandy and wooded; it is surrounded by a reef that extends 3 cables from its south-east side. South-west, distant 2 cables from the island, there is a sandbank with a rock on which there is 3 feet least water.

Directions.—From the eastward steer to pass northward of Hantu islet and for Hitam islet, to avoid the three rocks west-south-westward of the latter, then steer to the south-westward between the drying reef northward of Kekék islet and the islets off the western shore, anchoring north-westward of Kekék island in from 2 to 3 fathoms water, over mud.

Coast.—From Limbung bay the coast has a north-westerly direction for 5 miles to Duara river, which flows out of an inlet named Semarong bay, in which are Senanjar, Pandju and Seningka, three tolerably large villages. Further northward on this coast is Sekana village, between tanjong Lundang and tanjong Awa.

From tanjong Taki, the south point of Limbung bay, the 3-fathoms contour line encloses Hantu and Empo islets, passes close northward of Ujung Beting island and a mile off the entrance to Semarong bay.

Selengtang is a small, sandy islet, about 80 feet above high water lying North, distant 11 miles from tanjong Jang lighthouse; it is one cable in length in a north and south direction, half a cable in breadth, and covered with high trees. Lat. 0° 7¼′ S. Long. 105° 0½′ E.

Reefs.—The reef surrounding the island, which dries at low water, extends from its north-east side to a distance of nearly three-quarters of a mile, on the east side a quarter of a mile, and on the south side one-fifth of a mile.

At a quarter of a mile, S.W. ¼ W., from the south point of the island is a rock, half a cable in diameter, with a least depth of one fathom over it, and 8 to 10 fathoms close-to.

Another rock, 1¼ miles, S. ½ W., from the same point, has a least depth of 1¾ fathoms over it.

Anchorage, in 8 fathoms water, may be obtained on the west side of Selengtang.

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Chart, 1,789 [2,631].
Lat. 0° 8′ S.
Long. 104° 55′ E.
Var. 1° 10′ E.

Bujang island (Domino hill), 5¼ miles, W. by S., from Selantang, is about 2 miles in extent, hilly and wooded, with a peaked hill, 365 feet above high water, near its centre; it is "steep-to" on the north side but elsewhere is surrounded by a reef which dries, on which on the south-east side are two wooded rocks. Bulu village is situated in a small bay on the south-east side; here is a cocoa-nut plantation, and fresh water may be obtained.

Kongki Besar (Great Domino) island lies about 3½ miles north-west of Bujang island, and is hilly throughout its whole length with some remarkable peaks; the east coast of the island is steep and rocky.

Kongki Kechil island lies immediately south-westward of Kongki Besar, separated from it by a narrow channel, with depths of from 2½ to 6 fathoms, which is used by small vessels; on its eastern side there is a Chinese village of charcoal burners.

Lat. 0° 10½′ S.
Long. 104° 54¼′ E.

Gogong islet, north-east, distant 2 miles from tanjong Liang, is low and wooded; except on its south-west side it is surrounded by a reef that dries and extends for a distance of 4 cables.

Malang Bilang, a rock 14 feet above high water, surrounded by a drying reef, lies E. by S. ⅝ S. distant 8 cables from Gogong islet, and Pasir Panjang, a sandbank which dries and is 3 cables in length in a north and south direction, by 2 cables in breadth, is situated about a mile northward of Malang Bilang.

Chawan reef is about 8 cables in length and 3 cables in breadth, and dries; between it and the north point of Bujang island there is a small channel with depths of from 6 to 8 fathoms.

Meradinai rocks, two steep, wooded rocks, connected by a reef, lie about a mile south-eastward of Kongki Besar island with a small channel between in which there is 7 fathoms water.

Midway between these islets and Chawan reef there is a reef, with 2 fathoms water over it, on which two rocks are always above water.

Penah Laut, one mile southward of Kongki Kechil, is a sandy, wooded islet lying on a dying reef, and 4 cables from it there is a sandbank with some rocks which dry at low water.

Penah Darat, a small islet close to the southward of Kongki Kechil, is surrounded by a drying reef, and south-eastward of it is Seranggang, a small wooded islet.

Lat. 0° 1′ S.
Long. 104° 49¾′ E.

Blading island is the largest of a group of islets and rocks lying north-westward of Kongki Besar island.

Tidal streams.—The tidal streams almost always run strongly between the above islets, and they should not be approached too closely.

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Crocodile rock, about 15 feet above high water, lies with the south point of Kongki Besar island bearing South, distant 5 miles. Chart, 1,789 [2,531]. Lat. 0° 0¼′ N. Long. 104° 52¾′ E. Var. 1° 10′ E.

A large reef, showing by discoloured water, lies fully 3 cables westward of Crocodile rock; a shoal, with 5 fathoms water over it, lies about a mile northward. Two shoals, each with 4¾ fathoms are situated about 1½ and 2½ miles west-north-west, and another, on which the depth is 3¾ fathoms, 1¼ miles westward, of Crocodile rock.

Alut island, lying across the entrance to the Duara river, has on it two hills 512 feet above high water, and north-westward of it there is a group of islands having a small channel, with a depth of 3 fathoms, between them and the Linga coast. Lat. 0° 4′ S. Long. 104° 42′ E.

Kentar island, about 2 miles eastward of the south point of Sebangka, is hilly, the highest part near the south-east point being 394 feet above high water, which, when coming from the northward, and before the adjacent islands to the southward are visible, much resembles the hill on the east end of Linga.

It is surrounded by a reef that dries, and from the south side of the island, a bank, with less than 3 fathoms water over it, extends a mile. Nearly a mile to the southward of this a narrow bank stretches 2½ miles in an east and west direction, with 1¾ fathoms water over it, and westward of this there is a sandbank nearly always dry. Between the east end of the narrow bank and the bank extending from Kentar island, there is a small reef with a rock above water named Anak Langu.

Bakau island, lying about a mile northward of Kentar island, is surrounded by a reef, and Chandor and Beringin, two small islets, are situated on one reef about a mile north-north-westward of Bakau island. Lat. 0° 4¾′ N. Long. 104° 44½′ E.

Kapas, a small islet surrounded by a reef, and the north-westernmost of the group extending from Kentar, lies about 3½ miles north-north-westward of Bakau island.

A shoal, with 4½ fathoms water over it, lies nearly a mile south south-eastward of Kapas islet, and Karang Busung, a reef about a mile in length, in a north-east and south-west direction, lies about the same distance north-westward of the islet; a shoal, with 5 fathoms water over it, is situated about 2 miles westward of Karang Busung.

Pollux rock, a patch with one fathom water over it, and 10 and 11 fathoms close-to, is situated N.N.E. ⅛ E., distant 6 miles from the summit of Bakau island. Lat. 0° 10′ N. Long. 104° 47′ E.

Mesana island, 6 miles northward of the north point of Sebangka island, has the form of an elbow, of which the long arm extends Chart, 2,413 [2,530].

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

4 miles in a north-north-west and south-south-east direction, and the short arm 2 miles east and west.

Chains of hills run over the whole length of both arms, the highest point, 350 feet above high water, being where the arms meet. Niamok island, 188 feet above high water and situated about 1½ miles south-eastward of the south point, is surrounded by a reef which extends a mile north-eastward of it, with, at low water, several rocks which dry, and it is generally breaking; between Niamok and Mesana there is a sandy islet with some trees. On the east side of Mesana the coast-reef extends for a distance of 7 cables; and close to the rocky east point, and connected to it by a reef, is Kuju islet, which is moderately high

Shoal.—A shoal, on which the depth is 2½ fathoms, lies N.E. ¼ N. distant 1¾ miles from the eastern extreme of Mesana island; the 5-fathoms contour line is situated at distances of about 6 cables in a westerly direction; 5 cables in an easterly direction; three-quarters of a cable in a northerly direction and 3 cables in a southerly direction from the shoal head.

Anchorages.—At some distance off the north-east coast of Sebangka good anchorage may be obtained in depths of from 7 to 8 fathoms, over sand.

Good anchorage may also be obtained, in from 7 to 10 fathoms water, over mud and sand, about 5 miles eastward of the east point of Mesana island.

Lat. 0° 24′ N. Long. 104° 27′ E.

Merodong peak.—From 20 to 30 miles northward of Linga island are many small islands. The most conspicuous of them is pulo Merodong, which has a high conical peak, 797 feet above high water, the only hill of this feature in the vicinity. This peak is one of the principal objects which will enable a stranger to make out the entrance to Rhio strait; it may, however, occasionally be useful to vessels working to or from Singapore by the Outer route. (*See* also page 601.)

Chart, 2,757 [2,554]. Lat. 0° 38′ N. Long. 105° 10½′ E.

Frederick reef is the outermost of the reefs lying off the south-east coast of pulo Bintang. It is a steep rock, covered with coral, nearly 3 cables in length in a north-north-east and south-south-west direction and 2 cables in breadth, and has a least depth of 3 feet over it at low water, spring tides. The depths around are from 20 to 22 fathoms, except at the north-east side, where irregular depths of from 10 to 13 fathoms extend half a mile off. From the centre of the reef pulo Ruig bears N.W. ⅜ N., distant 23¼ miles.

In light winds the reef may be distinguished by the discolouration of the water, but with a fresh breeze it is difficult to distinguish breakers from the swell, except when the tidal stream is setting against the wind with a comparatively smooth sea. Off Bintang island at the change of the

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monsoon in April, the flood stream runs southward for 18 hours, and the ebb northward for 6 hours. In June the periods are reversed, consequently a stream against the wind (south-west monsoon) will only take place a few hours each day. (*See* tidal streams, page 598.) Chart. 2,757 [2,554]. Var. 1° 10′ E.

From the close examination made by Mr. Stanton in H.M. surveying vessel *Saracen*, he was led to believe that the other reefs which were said to exist near Frederick reef are identical with it, and that there are no other dangers in its vicinity.

Clearing marks.—As this dangerous reef lies in the direct track of vessels, the utmost care is necessary to avoid it. A vessel will keep eastward of it by not going into less than 25 fathoms; and to the westward of it by keeping Gin peak (a conspicuous hill, 337 feet high) Kwas hill (835 feet high on Bintang), and pulo Buruan, 308 feet above high water, well in sight, until the latter bears W. by N., which leads well northward of the reef.

Sandbank.—At about 11 miles N.W. by W. $\frac{3}{8}$ W. of Frederick reef is the northern termination of a narrow sandbank, with depths of from 7 to 10 fathoms over it, and "steep-to" on its eastern side. From this extreme, the bank trends in a south-west and west direction for about 33 miles to Messana island, at the entrance to Merodong strait. In the north-east monsoon when rain and thick weather are experienced, obtaining soundings on this bank will afford a good guide to clear Frederick reef and Geldria banks, and avoid anchoring in deep water. Lat. 0° 44′ N. Long. 105° 1¼′ E.

EAST COAST of PULO BINTANG.—Numerous islands and dangers lie, for a distance of 20 miles, off the southern part of the east coast of pulo Bintang, among which no vessel should venture. Vessels making the passage between Banka and Singapore straits should pass outside or to the eastward of the whole of these islands and dangers, and it is therefore only necessary here to notice the outermost of them. The whole coast, which is but imperfectly known, and the islands off it, are as a rule fringed with coral.

Kijang, a collection of different shaped hills, on the south-eastern side of the island are 840 feet above high water, and Kwas hill, 835 feet, 4 miles south-westward of them, has a summit in the form of a truncated cone. Lat. 0° 54½′ N. Long. 104° 38′ E.

Islands and reefs.—Pulo Gin, or Great island, is the name given to three islands, which are together about 4 or 5 miles in extent, lying about 6 miles south-eastward of the south-east extreme of pulo Bintang, and separated from each other by narrow channels. Several hills on the islands are from 200 to 300 feet high, and one, named Gin peak, rising about the centre of the south-eastern island, is 337 feet above high water and has a single tree on it. (*See* also page 609.)

General chart, 2,757 [2,554].

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Chart, 2,757 [2,554].
Lat. 0° 42½′ N.
Long. 104° 47′ E.
Var. 1° 10′ E.

Pulo Teroti, the southernmost of a cluster of islets, lying to the south-eastward of pulo Gin, is 112 feet above high water, and lies 2½ miles south-eastward of that island.

Lat. 0° 47½′ N.
Long. 104° 49′ E.

Pulo Buruan, the northern of these islets, lies 5 miles northward of Teroti, and being 308 feet above high water, and saddle-shaped, it is conspicuous and easily recognised.

Geldria banks are the outermost dangers, lying 13 or 14 miles eastward of pulo Gin, well out towards the fairway of vessels proceeding between Banka and Singapore straits, especially such as pass westward of Frederick reef. Their north-east extreme lies E. by N. ⅜ N., distant 15 miles from Gin peak, whence the banks extend in a south-west direction for about 2½ miles; having rocky heads with depths of 2 to 3 fathoms over them, 15 to 20 fathoms close-to the eastern side, and 7 to 12 fathoms, irregular depths, near the south-west and west sides.

Raleigh shoal lies 3 miles westward from the south-west extreme of Geldria banks, and has 2 fathoms water over a coral bottom, with pulo Buruan bearing W. by N. ⅓ N., distant 5 miles. Several patches of 4 fathoms lie northward and southward of it.

A patch, of coral and sand, nearly one mile in length and half a mile in breadth, with 2 fathoms water over it, lies 3 miles south-westward of Raleigh shoal, with the centre of pulo Buruan bearing N.W. ¼ N., distant 4½ miles.

Lat. 0° 49½′ N.
Long. 104° 56¾′ E.

Boat rocks (Kaju Ara), lying about 2½ miles north-west from the north end of Geldria banks, are three low rocks, the highest 13 feet above high water, visible about 4 miles. A rocky patch, with 3 fathoms water over it, lies about midway between.

Pulo Merapas, or Ruig, is the outer and eastern island off the east coast of Bintang. It is 315 feet above high water, covered with trees, and is "steep-to" at 3 cables off.

A coral bank, with depths of 3 to 5 fathoms over it, and about one mile in extent, lies S.W. by W. ½ W., distant 5¼ miles from pulo Ruig. Pulo Buruan bearing S S.W. leads eastward of it.

Clearing marks.—Pulo Teroti, bearing West, leads southward of Geldria banks and the other shoals; Boat rocks in line with pulo Buruan, bearing W. by S. ¾ S., lead northward, and pulo Ruig, N.N.W. ½ W, leads eastward of them.

PULO MAPOR or PANJANG, an irregular-shaped island from 3 to 4 miles in extent, lies about 8 miles off the east coast of pulo Bintang; its north west point is 360 feet above high water, and has on it a conspicuous tree. Rocks extend about one mile off its north-east point;

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and there are others, some above water, off its south-east point, the outer ones of which, named Bare rocks, are 55 feet above high water. Melibon, a pyramidal shaped islet, 90 feet above high water, lies 6 cables from the north-west point. Chart. 2,757 [2,554]. Var. 1° 10′ E.

Anchorage.—On the east side of island the coral reef—which as a rule fringes all the islands contiguous to the east coast of Bintang, as well as that coast itself—is absent, leaving a small sandy bay, where vessels may anchor in 8 or 9 fathoms water, about three-quarters of a mile off shore. As the bottom in parts of this bay is foul, care must be taken to keep the two Bare rocks open eastward of Tree islet, 58 feet above high water, forming the southern extreme of the bay and bearing about S. ½ E.

Water and wood may be procured in this bay, and boats can approach close to the beach at all hours of the tide.

Passage rock, 26 feet above high water, lies about three-quarters of a mile northward of the north-east point of pulo Mapor. Lat. 1° 1½′ N. Long. 104° 51½′ E

Pulo Sutu, or Volcanic island, of sugar-loaf form and 140 feet above high water, lies N.W. by N., distant 2 miles from the north-east point of pulo Mapor. It is "steep-to" on the north side, but a reef extends half a mile from its south extreme.

Pulo Sutu, with Middle rock, Black rock, and pulo Berlang (Blanhap), lying north and north-west of pulo Mapor or Panjang, form a sort of chain stretching from outside the dangers off the north coast of that island to the shore of pulo Bintang, and to the southward of which no vessel should attempt to pass.

Middle rock is a pinnacle, awash at low water, and 11 fathoms close-to, lying N.N.W., distant 2½ miles from the north-west point of pulo Mapor and nearly 4 miles from pulo Sutu. Black rock bearing W. ¾ N., or pulo Sutu S.E. by E., leads northward of it.

Black rock, 22 feet above high water, with a smaller rock close to its south side, and depths of 13 to 17 fathoms around, lies 6 miles west-north-westward of pulo Sutu.

Pulo Berlang (Blanhap) is a small island 90 feet above high water, lying 5 miles westward from Black rock, and nearly 2 miles from tanjong Berlang, on the north-east coast of pulo Bintang. Lat. 1° 6¾′ N. Long. 104° 40′ E.

COAST. — Landmarks. — From tanjong Berlang to tanjong Brakit, 8 miles north-westward, the north-east coast of pulo Bintang forms a bay indented with several bights. Over the point, at about one mile north-west of tanjong Berlang, is a conspicuous tree, the top of which is about 252 feet, and 2 miles within is a hill, 420 feet, above high water. Three-quarters of a mile northward of this hill, close to the coast, is another, named Double Tree hill, 334 feet above high water. Lat. 1° 6½′ N. Long. 104° 37′ E.

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Chart. 2,757 [2,554].
Lat. 1° 8′ N.
Long. 104° 36′ E.
Var. 1° 10′ E.

The shore of this part of pulo Bintang is for the most part fronted by a reef which projects in some places to the distance of half a mile; and just to the northward of the point, upon which stands the conspicuous tree, is a ledge of rocks, between which and the point north-westward of it, is Boat cove, apparently a convenient place for landing.

Water.—Several small streams of fresh water discharge themselves near the middle of this bay, but the watering place appears to be about one mile northward of Boat cove.

Soundings.—From Black rock, which is "steep-to," to pulo Kuku, a small island lying close to the eastern face of tanjong Brakit, and which may be approached to half a mile, the soundings shoal gradually, and the lead is a good guide. (For coast to the westward, *see* page 253.)

Tides.—It is high water, full and change, approximately, at tanjong Brakit, the north-east point of Bintang, at 11h. 0m. p.m.; at pulo Sutu at 3h. 40m.; at pulo Mapor or Panjang at 4h. 20m.; at pulo Buruan at 6h. 0m.; the spring rise is about 9 feet, but on extraordinary occasions it may be as much as 12 feet.

Tidal streams.—During the shifting months of the monsoons the tidal streams are regular, but during their strength the surface current will be always more or less governed by the wind.

The flood tidal wave comes from the northward, and runs nearly parallel to the east coast of pulo Bintang, along its southern side towards Abang strait, and to the northward in Rhio strait, meeting another flood stream from Singapore strait, near the town of Rhio.

The flood sets to the southward along the east coast of Linga, and close to tanjong Jang, its south-eastern extreme; from thence it runs westward to Penuba strait and obliquely across Linga bay to Berhala or Varella strait. From tanjong Jang to Saya island, and onwards to Banka strait, its direction is nearly South; another stream from about 2 miles southward of Saya island sets towards Berhala strait. *See* remarks on Frederick reef (tidal streams), page 594.

The ebb stream sets in the opposite direction, and the meeting of this stream from Banka and Berhala strait was observed to take place between Saya island and Tuju islands.

Winds.—Near and during the period of change from the south-east monsoon to the north-west monsoon, sailing vessels may be five and six weeks in making the passage from Singapore to Banka strait. In the month of September H.M. surveying vessel *Saracen* had the south-east monsoon strong, with much rain; about the equinox there were several heavy squalls. This monsoon is generally supposed to shift about the

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beginning of October, but during the whole of this month the wind was only four hours from the northward, there being a succession of calms, light southerly airs, a close muggy atmosphere surcharged with electricity, and frequent heavy Sumatra squalls or south-westers. On the 9th of November the monsoon shifted with furious gusts. Chart, 2,757 [2,554]. Var. 1° 10′ E.

These squalls at this season generally take place at night, accompanied with heavy rain, thunder, and lightning, and are of short duration. *See* rainy season, page 33.

DIRECTIONS by the Outer route from Banka strait to Singapore.*—The ordinary route for sailing vessels bound northward from Banka strait is between the Tuju islands and Saya island; they may, however, pass on either side of Saya island, which, being high and bold, is very convenient to make in thick weather or at night.

At night, or in thick weather, the lead may be very useful in detecting the drift caused by cross currents between the Tuju islands and Sumatra, for the depth decreases generally towards Sumatra, and increases towards those islands; but care should be taken in approaching them, as the remarkable irregularities of the currents have brought many vessels into the danger of being entangled among them. Near Sumatra a mud bottom mixed with sand prevails, and near the islands mud only.

Castor bank, lying north-eastward of Saya island, has barely 6 fathoms water over it, but a vessel will pass westward and between it and Ilchester bank, by keeping Saya island between the bearings of S.S.W. ½ W. and S. by W. until tanjong Jang lighthouse bears westward of N. by W. ½ W. Tanjong Jang, the east point of Linga (which, with a point to the westward of it, appears at a distance like two islands) bearing N.N.W. ½ W. will lead from 3 to 4 miles north-eastward of Castor bank and Ilchester shoal.

Having passed eastward of Saya island, a course may be steered to cross the equator in 20 or 21 fathoms, or in about long. 105° 30′ E., and the light on tanjong Jang will be a guide at night. From the equator, steer about North until past Frederick reef and Geldria banks, observing in the night not to come under 23 or 24 fathoms between lat. 0° 30′ N. and 0° 50′ N. to avoid those dangers; if it be day when pulo Merapas or Ruig is seen, keep it westward of N.W., and it will lead eastward of those dangers. When abreast of pulo Mapor, and in depths of 24 or 25 fathoms, a N.W. or N.W. by W. course, according to tidal streams, will lead to the entrance of Singapore strait. (*See* directions for South channel to Singapore, page 265, &c.)

* Continued from page 490.
General chart, 2,757 [2,554].

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CHAPTER XI.

RHIO STRAIT.

Chart, 2,413 [2,530]. Var. 1° 10′ E.

RHIO STRAIT.—General Description.—The route from Banka strait to Singapore, eastward of Linga and through Rhio strait, is the one commonly adopted by vessels proceeding either way between Sunda strait and Singapore, as Rhio strait is safe, sheltered, and easily navigable, the Netherlands Government having placed lights and beacons on many of the dangers; whereas the route eastward of pulo Bintang is exposed in both monsoons, and the fairway is encumbered with many dangers, which render it necessary for vessels to keep at a considerable distance from the land.

Rhio strait is available for all classes of vessels.

This route is particularly convenient for sailing vessels leaving Singapore for Europe in the north-east monsoon, and but few adopt any other. By proceeding through Rhio strait they avoid the delay and inconvenience so frequently experienced during that season in getting to sea by the main channel of Singapore strait, eastward of Pedra Branca (Horsburgh) lighthouse. In the south-west monsoon also, vessels are frequently able to proceed to the southward much quicker by this route than by the outer one.

Rhio strait, the southern limit of which is between Mesana and Telang islands, is bounded on the east by pulo Bintang, and on the west by the chain of islands of which Galang, Rempang and Batam are the chief; numerous smaller islands and shoals front the main shores on each side of the strait, and very much contract the width of its main navigable channel. The strait is about 50 miles in length, in a north-west and south-east direction, having depths ranging from 6 to 20 fathoms in the fairway, the least depths being in the southern portion of the strait. Better water than 6 fathoms could be carried, for which, *see* the chart.

The southern entrance of the strait is about 15 miles wide, for a distance of 11 or 12 miles contracting to 3½ miles between Little Karas island and the shoals southward of Tapai islands. About the middle of the strait, and 3½ miles northward of Great Karas island, is pulo Pankel, surrounded by dangers which extend 5 miles south-eastward from it and between these and the dangers northward of Great Karas island is the principal channel, about 2 miles wide, bounded on the west by the islets and banks off the north-east end of pulo Galang. The principal dangers are buoyed or beaconed.

General chart, 2,757 [2,554].

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At pulo Lobam, about 10 miles northward of Pankel, the strait is also about 2 miles in width between Johannes shoal and Orion rock, the narrowest part of the strait. Chart, 2,413 [2,530]. Var. 1° 10 E.

Northward of West point, the western extreme of pulo Bintang, the strait rapidly widens to its northern entrance, where it is about 10 miles in breadth.

The coasts of the strait are, for the most part, sparsely populated, the greater portion of the population consisting of Malays, and the remainder Chinese.

WEST SIDE.—Mesana island, at the southern entrance of the strait, is peculiar in shape, consisting of two narrow ranges of moderately elevated hills at right angles to each other; the longer range extends from the south point of the island 4 miles in a northerly direction, whence the shorter trends 2 miles eastward.

The shore reef extends in places to the distance of half a mile from the north shore of Mesana, and an isolated patch, with a depth of 2 fathoms over it, lies 6 cables off. A shoal, with 4 fathoms water over it, lies about 2 cables northward of Observation point, the north-west point of the island, and southward of a line joining that point and the north point of Merodong island, a distance of 5 miles in a west-south-west direction, the depths are generally under 5 fathoms with rocks and shoal patches. The east side of Mesana island is described at page 593.

Merodong peak, on the south-east end of Merodong island, is 797 feet above high water, and lies 4 miles westward of Mesana. This peak seen from the southward presents a conical appearance, and being the only hill of this feature in the vicinity is conspicuous. It is one of the principal objects which will enable a stranger to identify the entrance to Rhio strait, for it can nearly at all times be seen over Mesana as the strait is approached. The hill, from the peak, forms a shoulder to the north-westward, and gradually slopes in that direction, so that after Mesana is passed the conical shape disappears. *See* also page 594. Lat. 0° 24′ N. Long. 104° 27′ E.

Mesana and Merodong islands form the south side of Merodong strait.

Binan island, 3 miles north-westward from Mesana, is 2 miles in length, narrow at both ends, and widening to half a mile near the middle. The island is easily recognised by a conspicuous hill, 269 feet above high water, at its south-east end. A reef fronts the greater part of Binan, extending from a quarter to half a mile off the north and north-west sides.

Rifleman shoal, situated about a mile eastward of Binan, is a patch of hard sand 3 cables in extent, the least water being 2 fathoms; from this spot Binan hill bears S.W. $\frac{1}{8}$ S., distant $1\frac{1}{4}$ miles. In the vicinity of the shoal there are depths of from 7 to 10 fathoms and good anchorage may be obtained. Lat. 0° 28¾′ N. Long. 104° 28¾′ E.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Katang Linga island, 1½ miles north-west from Binan, is a bold, bluff looking island, nearly one mile in length and half a mile in breadth, and 246 feet above high water on the northern side, but on the southern side is low; a reef fronts the greater part of it, extending in some places about 2 cables. A shoal of sand, coral, and stones, with 4 feet water over it, lies three-quarters of a mile west-south-west from the north point of Katang Linga, but it is quite out of the track of vessels navigating Rhio strait.

Binan and Katang Linga form the eastern limit of a number of islands named the Titampan group (*see* page 647).

Lat. 0° 30¼′ N. Long. 104° 21½′ E.

Selanga islands, three in number, are small, but elevated and conspicuous; they lie 3 miles westward of Katang Linga. Vessels working should not stand to the southward of a line joining Katang Linga and North Selanga.

A large white rock above water, with a reef which dries at low water near it, lies about a mile east-south-eastward of Selanga islands.

Udip, an islet 130 feet above high water, thickly wooded and surrounded by a reef that extends about a cable from its eastern side, lies 3¾ miles west-north-westward from North Selanga; both these lie out of the direct tract of vessels, but those working through should not stand to the southward of a line drawn between North Selanga and Udip, in order to avoid a rock awash which lies W. ½ N., distant 2 miles from North Selanga.

Pulo Galang is hilly, thickly wooded and divided into two parts by Penjabung strait, from 1½ to 2 cables in breadth (except at its western end, where the breadth is less than half a cable) and with depths of from 3 to 5 fathoms; the southern portion of the island is known as Galang Baru. Chirum point (tanjong Maralagan), the eastern point of pulo Galang, is high and thickly wooded. Dempu point is the east extreme of pulo Korek Rapat, which lies nearly 3 miles south-eastward of Chirum point.

Lat. 0° 36′ N. Long. 104° 18½′ E.

Pulo Rondo or Dempu, 129 feet above high water, lies about 8 miles north-westward from Katang Linga, and about 1½ miles south-eastward of the south end of Galang Baru. It is a remarkable little, thickly wooded island, showing very round and bold against the adjacent land, and is one of the most useful objects for recognising the entrance to the strait when coming from the southward.

Haai reef (page 651), a patch with a depth of 1½ fathoms over it, lies a quarter of a mile to the southward of it; and there is a rock above water about 3 cables to the north-north-westward.

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The east end of Little Karas island open of Dempu point, bearing N. by E. $\frac{5}{8}$ E., clears Haai reef, passing 3 cables to the eastward. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Great Bank is situated within the edge of the 5-fathoms contour line fronting the bight between the south-east extreme of pulo Galang and East Selatan island. The bank is $1\frac{1}{2}$ miles in length, with a least depth of 2 fathoms, and affords temporary anchorage on, and within, it for vessels of light draught.

East Bank, the shoalest part of which lies one-third of a mile, S. by E. $\frac{1}{4}$ E., of Dempu point, is little more than half a mile in extent, with from 4 to 9 feet water over it, and 8 to 9 fathoms close-to. Lat. 0° 40½′ N. Long. 104° 21′ E.

Great Karas island, situated $4\frac{1}{2}$ miles northward of Dempu point, is $3\frac{1}{2}$ miles in length by three-quarters of a mile in breadth; it is hilly with a flat summit, wooded, and has a reef encircling it extending in places a quarter of a mile. The island is inhabited, and has a conspicuous tree with a bare trunk standing near its east extreme.

A patch, which dries, lies about two-thirds of a mile, N.N.E. $\frac{1}{2}$ E., from the north-west point of the island; from the same point and extending nearly half-way along the north coast of the island is a bank, with depths of from $2\frac{1}{4}$ to 3 fathoms, projecting nearly one mile from the shore, and for half a mile farther in the same direction the depths are under 5 fathoms; vessels when abreast it, should keep the whole of Little Karas well open of Great Karas, bearing S.E. $\frac{3}{4}$ S.

Tjassens shoal is triangular shaped, with its base, about $3\frac{1}{2}$ miles in length, on the south side of Great Karas island, its extreme point being situated about 2 miles from the east and 4 miles from the west points of the island; it has from 4 to 18 feet water over it, and a reef which uncovers at half ebb is situated on its south-east extreme, S. by W. $\frac{1}{4}$ W., distant $1\frac{1}{2}$ miles from the south-east point of the island.

There is a channel on each side of Tjassens shoal, but the northern one, crossing a neck of the shoal, has a depth of $2\frac{1}{4}$ fathoms and is only available for small vessels; the southern channel, between Tjassens shoal and Tarong island, is nowhere less than three-quarters of a mile wide, with depths of from 6 to 13 fathoms. Care is necessary, however, when avoiding Tjassens shoal, to give a safe berth to a small reef which lies one-third of a mile off the north-east part of Tarong island; and when the west end of Great Karas bears N.E., steer to pass midway between the west extreme of that island and Stone islet, to avoid the reefs situated on the bank fronting pulo Galang.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Little Karas island, marking the south-west end of the narrow part of Rhio strait, is a quarter of a mile in length in an east and west direction, formed of two small hills, and fringed by a narrow reef.

A bank, with less than 3 fathoms water over it, extends about 2½ cables north-westward of the island.

Lat. 0° 44½′ N. Long. 104° 22¼′ E.

LIGHT.—On the eastern hill of Little Karas island an iron framework, 46 feet in height, and painted white, exhibits, at an elevation of 121 feet above high water, a *white flashing* light with a period of system of *twenty seconds*, showing a *flash* for *five seconds*, followed by an eclipse of *fifteen seconds;* it should be visible, in clear weather, from a distance of 14 miles, between the bearings of S. 58° E., through south, to N. 17° E.

Landing may be effected on a sandy beach on the south-west side.

Dittlof (Seguchi) reef lies S. ¾ E., distant about 9 cables from Little Karas light structure, consists of sand and rocks, and uncovers. A patch, with 3 fathoms water over it, "steep-to," lies about a quarter of a mile south of it; and between Dittlof and Little Karas island there is a patch on which the depth is 2 fathoms.

Lat. 0° 47¾′ N. Long. 104° 16¾′ E.

Tarong point (tanjong Semandur), the north-east extreme of Galang island, lies 2½ miles north-westward from the west end of Great Karas, and has on its northern side a small bay, in which there is a village. A reef fronts the point to a distance of a quarter of a mile.

Stone island (pulo Penika), consisting of some rocks on which there is a small, conspicuous wood, is surrounded by a reef and lies inside the edge of the 5-fathoms contour line, which passes about 1½ miles eastward of the east coast of pulo Galang, and nearly midway between the west end of Great Karas island and Tarong point.

Mubut islands.—At 6¼ miles north-westward of Little Karas island is East Mubut (pulo Mubut Laut), 114 feet above high water, and inhabited; it is the larger and higher of the two Mubut islands, and easily distinguished by its prominent position off the deep inlets to the westward. It rises to a round peak, with the greatest declivity on the eastern side; whilst the smaller island, West Mubut (pulo Mubut Narat), is considerably lower towards its centre, and thickly wooded.

A reef, with depths of less than 3 fathoms, on which there are some rocks drying at low water, extends 2 miles to the southward of East Mubut island, which will be avoided by keeping the west extreme of Great Karas island bearing westward of S. by W. A reef also extends 1½ miles northward of both islands; the north and east extremes of Sembulang point in line, bearing N.W. ½ W., leads close eastward of it.

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Tiung strait, the opening between pulo Galang and pulo Rempang, is blocked by a sandbank at about half a mile westward of West Mubut island, having general depths of from 6 to 12 feet; reefs also lie from 3 to 7 cables northward of Tarong point. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Buoy.—The eastern extreme of a long shoal on the southern side of the strait is marked by a can buoy, painted black.

Sembulang point, the eastern extreme of pulo Rempang, is a remarkable precipitous point overgrown with tall trees on the western side of the main channel; the hill within it is 252 feet above high water. The point is fronted by a reef to the distance of about $1\frac{1}{2}$ cables, close to which are depths of 5 to 8 fathoms. A detached reef lies 4 cables off the north shore of pulo Rempang, and S.S.W. of Chemara bank; the water in the bight westward of it is shallow. Lat. 0° 51½′ N. Long. 104° 16¼′ E.

Sungi Sembulang, a small river with its entrance dry at low water, runs into the sea nearly 2 miles westward of Sembulang point, and here there are two small villages. Pulo Pakaul, a small island near the shore, half a mile northward of the entrance, shows up well against it on account of the darker colour of the trees on it.

A patch, with a depth of $4\frac{3}{4}$ fathoms over it, lies about $1\frac{6}{10}$ miles east-north-eastward of Sembulang point, with the eastern point of East Mubut S. by E, distant $2\frac{9}{10}$ miles.

Chemara bank, lying about $3\frac{1}{2}$ miles north-westward of Sembulang point, and about $1\frac{1}{4}$ miles eastward of Chemara island, is $1\frac{1}{4}$ miles in length in a north-north-west and south-south-east direction, with a least depth of $1\frac{1}{2}$ fathoms; it consists of three narrow ridges having a north-west and south-east direction. The east point of West Mubut island just open of Sembulang point, bearing S.S.E. $\frac{1}{8}$ E., leads 6 cables eastward of the bank. Lat. 0° 54½ N. Long. 104° 14 E.

Buoy.—A buoy, painted white and surmounted by a staff and ball, is moored on the eastern side of this bank.

Anchorage.—During the south-east monsoon good anchorage, in 5 fathoms water, may be obtained southward of Chemara bank with the east point of East Mubut island just open of Sembulang point, bearing S.E. and pulo Pakaul, South.

Chemara island, the southernmost of the chain of islands which front Salat Bulang between pulo Batam and pulo Rempang, is hilly and partially covered with high trees. It is 341 feet above high water, about $1\frac{3}{4}$ miles in length, in a north-east and south-west direction, three-quarters of a mile in breadth, and surrounded at a short distance by a reef; there is a village on the south-east side. A bank, with less than 3 fathoms water over it, extends for a distance of nearly a mile from the south-east side, and between it and Chemara bank the depths are from $3\frac{1}{2}$ to 5 fathoms.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Pulo Tunjuk or Chemara Kechil, lying nearly 1¼ miles northward of Chemara island, is flatter than that island and entirely covered with vegetation; it is about one-third of a mile in extent, and surrounded by a reef which on the east side projects a quarter of a mile. A ridge with rocky patches, some drying, connects these islands, and a patch, with a depth of 3 fathoms over it, lies 4 cables north-eastward of the north-east point of Chemara island.

Lat. 0° 56¾′ N. Long. 104° 12¼′ E.

LIGHTS.—Two leading lights are shown on pulo Tunjuk.

The high, or rear light, on the south point of the island, is a *white flashing* light with a period of system of *three seconds* exhibited at an elevation of 72 feet above high water, showing *flash one second* followed by an eclipse of *two seconds* duration; it should be visible, in clear weather, from a distance of 14 miles. Between the bearings of S. 6° W. and S. 85° W. this light is partially obscured by trees.

The low, or front light, is *red fixed,* shown at an elevation of 57 feet above high water, and situated N. 2° W., distant 2¼ cables from the high light; it should be visible, in clear weather, from a distance of 13 miles, between the bearings of S. 4° W., through south, and S. 6° E.

The lights in line bearing S. 2° E. lead through the northern entrance of Rhio strait.

The keeper's dwelling is painted white with a red roof, and stands near the high light where is also the acetylene house, a small building painted white, with a grey roof. Near the low light is a small watch tower painted white, with a red roof.

Pulo Subang Mas and Ayer Radya islands. — Pulo Subang Mas lies westward of pulo Tunjuk and Ayer Radya close to the northward of it, is separated by a narrow channel which dries at low water, and is the northernmost of four islands lying between Chemara island and Salat Bulang; both these islands are hilly and covered with tall trees. Antu (pulo Pencharas) is a small, round island lying close to the north-east point of Ayer Radya, from which it is separated by a channel having depths of from 3 to 5 fathoms; a rock above water, of a reddish colour, and having on it a conspicuous tree, lies on the shore reef off its north-east point.

Johannes shoal.—On the eastern edge of the 3-fathoms contour line, fronting the bay between the eastern extreme of pulo Subang Mas and Antu, lies Johannes shoal, a patch with 2 fathoms water over it and 7 fathoms close outside. Sembulang point kept open eastward of pulo Tunjuk, bearing S.E. ¾ S., leads eastward of Johannes shoal, and of the reef extending from Antu.

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Orion rock, page 619, lies 2 miles north-eastward of Johannes shoal, between which is the narrowest portion of the fairway. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Pulo Nginang, a hilly island, situated 1¼ miles northward of Ayer Radya, with Salat Bulang between, is about 2¼ miles in length in a north-east and south-west direction and 1½ miles in breadth. A reef fringes the southern and eastern sides of the island, extending to the distance of one-third of a mile.

Nginang reef is small, dry at low water, and usually marked by fishing stakes: it lies on the north side of the entrance to Salat Bulang, and nearly three-quarters of a mile from the south-east side of pulo Nginang, with pulo Antu bearing S. by W. ¾ W. distant 1¼ miles. Patches of 4 and 5 fathoms lie about 3 cables south-west and north-east respectively from the reef. Pulo Sau lighthouse, bearing N. by W., leads eastward of Nginang reef.

Pulo Sau lies close northward of Nginang, and has a lighthouse on its eastern extreme. Southward of this point a reef of coral and sand fronts the shore to the distance of 2 to 3 cables, its southern portion forming the north side of Pedissa channel, the narrow channel between Sau and Nginang, which has depths of from 3 to 6 fathoms. A detached rocky patch lies S.E., distant a quarter of a mile from Sau lighthouse.

LIGHT.—On the east point of pulo Sau an iron support, 36 feet in height, painted white, and with a dwelling near it, exhibits, at an elevation of 108 feet above high water, an *white occulting* light, with a period of system of *twenty seconds*, which shows light for *fifteen seconds*, followed by an eclipse of *five seconds* duration, and should, in clear weather, be visible from a distance of 14 miles between the bearings of S. 30° E., through south, to N. 30° E. Lat. 1° 3′ N. Long. 104° 11′ E.

Shoal.—A small shoal, with a depth of 4 fathoms over it, lies with pulo Sau lighthouse N.W. ¾ N., distant 1 4/10 miles. Sau lighthouse bearing N.N.W. leads between Nginang reef and the patch of 4 fathoms, or West point bearing North leads eastward of these dangers.

Pulo Nginang Kechil lies on the north-east part of the reef which surrounds pulo Sau; there is a conspicuous red patch on the east side of the island. A bank, with from 2 to 2½ fathoms water over it, extends about half a mile, N.W. by N., from Nginang Kechil; and another, half a mile in extent, with from 2 to 2¾ fathoms water over it, lies a quarter of a mile beyond, in the same direction.

Van Gogh's islet, consisting of several rocks above water, partially overgrown with low brushwood, lies half a mile north of pulo Sau, and is surrounded by a reef which extends south-westward nearly half a mile; Lat. 1° 4¼′ N. Long. 104° 10′ E.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

the reef dries at low water and has a rock on it visible at high water. About half a mile west-north-westward of Van Gogh's islet is the southern extreme of a narrow coral reef with 2 feet least water over it and "steep-to"; its northern edge of 3 fathoms lies with the north point of pulo Sau bearing S. by E. ½ E., distant 2 miles.

A shoal with 2½ fathoms, half a mile in extent, is situated north-eastward of the islet, from which its eastern side is distant 6 cables.

Clearing mark.—Pulo Sau lighthouse in line with the east point of Nginang Kechil, bearing S. ⅝ E., leads eastward of all these dangers; and Malang Jarong (an islet off the eastern shore), bearing E. by S, leads northward. The depths decrease rather quickly under a depth of 10 fathoms near the dangers just described, and a sailing vessel, standing towards the southernmost of them and getting a cast of 10 fathoms or less, should tack immediately.

COAST.—The north-east coast of pulo Batam, from abreast pulo Sau to tanjong Nongsa or Burong, the western point of the north entrance to Rhio strait, is hilly and completely overgrown, with a few villages; it is fronted by a reef, extending in some places to the distance of three-quarters of a mile, having on it some large rocks of a reddish colour, above water, the largest being Batu Besar, north-eastward of the village of that name. There are also several fishing enclosures on this reef.

Lat. 1° 8½′ N. Long. 104° 9¾′ E.

Malang Orang (Karang Passo), an isolated reef, half a mile in extent, which dries at low water, has depths of from 5 to 8 fathoms close-to and is half a mile off shore, with a narrow channel, with depths of from 4 to 7 fathoms, between it and the coast reef; it lies with tanjong Malang Orang bearing W.N.W., distant about 7 cables.

Buoy.—A conical buoy painted white and surmounted by a staff and ball, marks the eastern edge of this reef.

A rocky patch of small extent, with a depth of 4 fathoms, lies with Batu Besar bearing N.W. ⅞ N., distant 2 3/10 miles.

Lat. 1° 9¾′ N. Long. 104° 11¼′ E.

Pan reef, lying in the northern entrance of Rhio strait, at 2⅛ miles east-north-eastward of tanjong Malang Orang, is visible at low water, when it appears as a ridge of black stones; the reef is 6 cables in length, in a north-east and south-west direction, 2 cables in breadth, and "steep-to" on all sides except the south, with depths of 5 to 7 fathoms close-to.

Beacon.—A large screw pile beacon, surmounted by a truncated cone, painted black, marks the north-east end of the reef.

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Buoy.—A conical buoy, painted black and surmounted by a truncated cone, is moored off the south-west extreme of the reef, 6 cables from the beacon. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Pas-op, or Little Pan reef, lying N.W. by W., distant 2½ miles from Pan reef beacon, and 1¼ miles off shore, is a coral patch, dry at low water, with depths of 3½ to 7 fathoms close around it.

Buoy.—A conical buoy, painted white and surmounted by a staff and ball, marks the north-west extremity of this reef.

Channels.—There is a safe passage on either side of Pan reef; that on the west side between the reef and the Batam coast, although not so wide as the eastern or main passage, is more convenient for sailing vessels anchoring, in case of meeting with light baffling winds and contrary tidal streams; the depths being from 6 to 10 fathoms. Native pilots seldom use the eastern channel, where the depths are much greater.

Seamen will find no difficulty in proceeding by either channel, aided by the Admiralty chart. The depths in the eastern channel are too irregular to admit of any useful description here, but the screw pile beacon on the Pan reef will always point out the position of that danger in time to give it a proper berth, even if the buoy moored off the south end should be adrift.

Clearing marks. — Pulo Sau lighthouse in line with the east extreme of Nginang Kechil, bearing S. ⅝ E., is a good mark for passing between Pan and Little Pan reefs; tanjong Sau (tanjong Butan), on Batam, open of the land, bearing about S. by W. ¼ W., also leads eastward of Pas-op reef. Pulo Sau lighthouse bearing S. ½ W., or Barbukit hill (on the Malay peninsula), bearing N. ¼ W., leads eastward of Pan and Pas-op reefs; and when pulo Nongsa is open of tanjong Nongsa, W. ¾ N., a vessel will be northward of them and in Singapore strait.

EAST SIDE OF RHIO STRAIT.—Pulo Telang, or Abu, the south-west point of which forms the south-eastern limit of Rhio strait, is irregularly shaped, nearly 5 miles in length, north-east and south-west, and about one mile in breadth. It may be known by a square hillock on its south end, 350 feet above high water, which, with a sharper peak westward of it, forms a saddle; the land from this to the western end of the island is nearly of the same elevation. Chart, 2,757 [2,554]. Lat. 0° 42¼′ N. Long. 104° 37′ E.

A reef fringes the west shore of the island to the distance of about 2 cables, with depths of 6 to 7 fathoms close-to.

Pulo Gin, or Great island (*see* page 595), lies 2 miles eastward of the northern part of Telang, and is one of the prominent objects marking the south entrance of Rhio strait.

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Chart, 2,413 [2,530].
Lat. 0° 41½′ N.
Long. 104° 37¾′ E.
Var. 1° 10′ E.

Hendrik Jan rock, a small but dangerous pinnacle, with a depth of 2 fathoms over it, and 9 to 10 fathoms close to, lies S.S.E. ¾ E. distant 8 cables from the south-eastern point of Telang, with the summit of South-west hill in line with the south-west extreme of Telang, about N.W. by W. ⅝ W. A patch, with a depth of 4½ fathoms over it, lies about 3 cables, W. by N., of the rock.

CAUTION.—Several other shallow patches were found in the channel between Telang and Gin; but they all, except Hendrik Jan rock, lie out of the ordinary track of vessels, and are dangerous only in the event of this channel being mistaken in thick weather for the entrance to Rhio strait. Vessels should give these islands a berth of 2 miles in passing, and not bring pulo Teroti eastward of E. by N., until South-west hill comes well open of Telang, bearing about N.W. by W.

Siulung and Mantang islands, separated by a narrow strait, named Salat Mara Liman, in which the average depth is about 4 fathoms, are together about 8 miles in length, in an east and west direction, 1½ miles in breadth, and lie north-westward of pulo Telang, with a channel about 1½ miles wide between.

Mantang, the western island is low, overgrown with mangroves, especially on the south coast, and encircled by a reef that dries; on its south-west end is South-west hill, 267 feet above high water and wooded, which makes from the southward as a double-peaked hill. The west side of the island is foul to the distance of about 2 cables.

Lat. 0° 45½′ N.
Long. 104° 35¼′ E.

At 4½ miles eastward of South-west hill is Siulung hill, with a table summit. It rises abruptly on its north side to an elevation of 507 feet above high water, and terminates southward in a bluff point, close to which is Segai islet, which is 66 feet above high water and inhabited.

At a distance of 12 miles to the southward, both Siulung and South-west hills, owing to the land between them being low, appear as islands.

Between South-west and Siulung hills is a bay about one mile deep, fronted by a fringe of reef and a shallow bank extending in places nearly three-quarters of a mile, upon which latter lie detached patches of reef; the channel between the islands is entered from this bay.

Thomas shoal, a patch 4 cables in extent, with a depth of 2 fathoms, lies W.S.W., distant nearly one mile from Segai islet.

Anchorage.—There is good anchorage between Thomas shoal and South-west hill, in from 6 to 10 fathoms water, with shelter from northerly winds, but vessels should not stand into a less depth than 5 fathoms, as within that depth the bottom becomes irregular and shallow.

General chart, 2,757 [2,554].

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Siulung channels.—There are channels on either side of Siulung leading into the China sea, northward of pulo Gin; but as they are quite out of the ordinary track of vessels they should not be attempted by anyone not locally acquainted. The southern channel, between Siulung and Telang island, is about 1½ miles wide, with depths varying from 14 to 24 fathoms in mid-channel, and from 5 to 9 fathoms near the shore on either side. Some reefs lie at the eastern end of the channel, rendering it somewhat intricate. Chart, 2,413 [2,530]. Var. 1° 10′ E.

The northern channel, between Siulung and the coast of pulo Bintang, has several islands and reefs lying along and extending in places 2½ miles from the Siulung shore. The western of these are Blading island and Alligator reef, and vessels should not pass eastward of a line drawn from them to Alligator island.

Two reefs lie on the northern side of the channel; Malang Berdaun or Prins reef, the western, is one mile distant from tanjong Batu Babi; Pasir reef, the eastern, is about 1¾ miles south-eastward of the same point. The entrance to the channel, between the eastern reef and Blading island, is 1½ miles wide, with depths of from 4 to 5 fathoms, but eastward of Blanju islet the depths in mid-channel increase to 7 and 19 fathoms. Enam village and the river of that name are situated on the Bintang coast northward of pulo Bunot, and a rock that dries lies south-westward of the river entrance; all the coast is wooded, but not high. Lat. 0° 50′ N. Long. 104° 28½′ E.

At the eastern end of the channel are several islands and reefs, which render it, like the channel southward of Siulung, somewhat intricate.

Anchorage.—Eastward of tanjong Batu Lichin, vessels may anchor, at any convenient distance from the Bintang shore, in depths of from 12 to 18 fathoms.

Tidal streams.—The tidal streams in Siulung channels run with considerable strength, and there are numerous overfalls.

Alligator island, a small rocky island, thickly wooded, and 101 feet above high water, is three-quarters of a mile in length and a quarter of a mile in breadth, and lies 2 miles westward from South-west hill. From a distance this island makes very much like South-west hill of pulo Siulung, only is smaller. Lat. 0° 45½′ N. Long. 104° 29′ E.

A rocky patch, nearly awash, lies 2 cables north-east of Alligator island; and another patch, having 1¼ fathoms water over it, lies nearly three-quarters of a mile eastward of the south point of that island. There is a channel, with a depth of about 4½ fathoms, between this reef and Siulung island, but it is not advisable to use it, except with local knowledge.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Alligator reef, dry at low water, lies one mile, N. by W., of Alligator island, and is a quarter of a mile in extent, with depths of 4 and 5 fathoms close-to.

Lat. 0° 48′ N. Long. 104° 29½′ E.

Blading island, lying 1¼ miles northward of Alligator reef, is small, conspicuous, and covered with tall trees; it is surrounded by a reef which extends in a southerly direction more than a quarter of a mile. A small detached reef lies 4 cables eastward of the island.

Eastward of Alligator reef and Blading island are several islands lying off the northern shore of Siulung, viz.:—Hangas (pulo Dendon), pulo Bakau, pulo Alang and Blanju (pulo Antu); they are wooded, but lower than Blading island.

To the southward of a line joining Blading and Blanju islands are several reefs drying at low water, and their positions are sometimes indicated by fishing stakes; northward of the line joining the above islands the channel is clear.

Pulo Kekip and pulo Bunot, on the north coast of the western pulo Siulung, and separated from it by a narrow channel, in which the depths are from 4 to 10 fathoms, are two islands entirely overgrown. On this north coast are Baru, Mantang, and Rhio villages.

Lat. 0° 50′ N. Long. 104° 28½′ E.

Malang Berdaun or Prins reef, lying 2 miles, N. by W. ½ W., from Blading island, is awash at low water, about a third of a mile in extent, and forms, with that island, the western entrance to the channel between Siulung and the coast of Bintang. It lies on the outer edge of the shallow bank which fronts tanjong Batu Babi and the shore of pulo Dompa, and is the western of the two reefs before mentioned as lying off the Bintang shore. Lanjut reef, which dries, lies between Malang Berdaun and the shore.

Pasir reef, also awash, and about the same size, lies one mile east-south-eastward of Malang Berdaun, with a bank, with from 1½ to 2 fathoms water over it, extending one mile in an easterly direction from it.

To the westward of these reefs there are several large fishing enclosures, standing on the edge of the bank, which can be seen from some distance.

Tapai islands are a cluster of five round islets covered with vegetation, and lying on coral ledges, between 2 to 3 miles westward of Alligator reef; the eastern group consisting of three, and the western of two, are connected by a reef, which dries. When approached from the southward these islets, as they rise above the horizon, present very much the appearance of the topies, or hats, in use among the Malays, hence their name. The north-western and the eastern islands are the largest of the group; the former (Topai island) is 134 feet, and the latter 118 feet, above high water.

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Reefs.—A small coral reef, which dries only at very low water, lies half a mile, N.N.W., from Topai island. A bank half a mile in length, in a north-north-west and south-south-east direction, with $2\frac{3}{4}$ fathoms water over it, lies with its outer edge bearing S.E. by S. distant three-quarters of a mile from the eastern island. Chart, 2,413 [2,530]. Var. 1° 10′ E.

A narrow bank, with 4 to 5 fathoms water over it, extends about $2\frac{1}{2}$ miles in a southerly direction from Topai island, with from $5\frac{1}{2}$ to 6 fathoms on either side; less water may exist.

Two patches, with $4\frac{3}{4}$ and 5 fathoms water over them, lie S. $\frac{3}{8}$ W. and S. by E. $\frac{3}{4}$ E., distant $3\frac{1}{2}$ and $3\frac{3}{4}$ miles respectively from Topai island.

Rotterdam reef, consisting of sand and rocks, has a least depth of $1\frac{1}{2}$ fathoms over it, and lies with Topai island bearing E. by N. $\frac{1}{2}$ N., distant 7 cables. Lat. 0° 46½′ N. Long. 104° 25¼ E.

Buoy.—A conical buoy, painted white and surmounted by a staff and ball, is moored on the west side of the reef.

A shoal composed of sand and stones, with a depth of 11 feet over it, lies with the north extreme of Topai island bearing E. by S., distant 2 miles, and Little Karas island lighthouse S.W. by S.

Buoy.—A can buoy, painted black and surmounted by a staff and truncated cone, is moored on the eastern side of the shoal.

Dutch shoal, a quarter of a mile in extent with 3 fathoms least water over it, and 6 or 7 fathoms close to its western side, lies with the south extreme of pulo Pankel bearing N.W. $\frac{3}{4}$ W., distant $1\frac{1}{2}$ miles. Lat. 0° 48 N. Long. 104° 22½′ E.

The two last-mentioned dangers are situated on a triangular-shaped bank $4\frac{1}{2}$ miles in length in a north-west and south-east direction, with depths under 5 fathoms.

Clearing mark.—A good mark to clear the western edge of this bank is the summit of pulo Lobam open of the west extreme of pulo Pankel, bearing N.W. by N.

Pulo Pankel, about 2 miles in length in a north and south direction, and half a mile in breadth, is hilly and wooded and lies on the eastern side of the main channel of Rhio strait, abreast of Great Karas and Mubut islands, and from a distance appears as two round hills. It is surrounded by a reef which extends from a quarter of, to half, a mile from the shore, and near its south-west point there is a narrow, sandy beach and a village.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

At the north-west part of the island, a bank, with less than 3 fathoms water over it, extends to a distance of three-quarters of a mile, and the 5-fathoms contour line is nearly 1¼ miles from the island. Eastward of this bank, and 6 cables northward of the island, lies Pankel reef, a patch of rocks about a quarter of a mile in diameter, which dry at low water.

Rupels reef, which dries at low water, is about 2 cables in extent, and lies with the north extreme of pulo Pankel bearing N.W., distant 1½ miles. A narrow ridge, on which the depths are less than 3 fathoms, extends about one mile southward from Rupels reef.

Anchorage.—On the south-west edges of the banks which border the north-east side of the main channel of Rhio strait, good anchorage may be obtained in depths of from 5 to 6 fathoms.

Lat. 0° 51½′ N. Long. 104° 23½′ E.

Suri island.—Suri island, lying east-north-eastward about 1½ miles from pulo Pankel, is a small, low islet inhabited and covered with cocoa-nut trees; it is surrounded by a narrow sandy beach and a reef which extends to the distance of half a mile in places. A bank, with 2 to 5 fathoms water over it, extends about 1¾ miles in a south-south-east direction from it.

Dangers.—A patch, on which the depth is 3 fathoms, lies with Suri island bearing W. by N. ½ N., distant about 5 cables, and 3 cables eastward of it another patch, with 4¾ fathoms water over it, lies nearly in the fairway.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, marks the eastern side of the 3-fathoms patch.

Suri reefs.—At about 1¼ miles north-north-westward of Suri island lies a reef, nearly awash in places, one-third of a mile in diameter, with depths of 5 to 8 fathoms in the passage between. About one mile north-west from this detached reef is the south-east end of the largest of the Suri reefs; it is a narrow strip of sand and coral about 1¼ miles in length in a north-west and south-east direction, nearly awash, and surrounded by a bank with 2 to 3 fathoms water over it, and 5 to 7 fathoms close-to.

Buoy.—A conical buoy, painted white and surmounted by a staff and ball, is moored, in about 5 fathoms water, off the northern extreme of the reefs.

Pulo Dompa (Setumu) is 4 miles in length, in an east and west direction, 1¾ miles in breadth, and separated from the west coast of pulo Bintang by a narrow channel only available for boats. It is hilly and more or less covered with tall trees; a hill on the north side, 253 feet above high water, has on it a remarkable tree, with a square top, and on

Lat. 0° 53′ N. Long. 104° 27¼′ E.

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tanjong Dompa, the west extreme, which is low and in places overgrown with brushwood, there is also another conspicuous tree. Dompa village is near tanjong Rambut, the east extreme. Chart, 2,413 [2,539]. Var. 1° 10′ E.

Basing and Sekatap, two small islands, low and wooded, lie off the south shore of pulo Dompa, both being on a reef, with depths under 3 fathoms extending from it. Basing island is inhabited. Patches of less than 3 fathoms extend one mile south-eastward of Basing island, and eastward of it there is a reef which dries at low water.

From Basing island, a bank with 1½ to 3 fathoms near its edge, and 9 to 13 fathoms at a short distance, extends in a northerly direction, trending about one-third of a mile westward of tanjong Dompa, and thence to pulo Penjengat.

The navigable channel, between pulo Dompa and Suri island reef, is about 7 cables wide, and used by vessels bound to Rhio from the southward.

Buoy.—A conical buoy, painted white and surmounted by a staff and ball, is moored in 5 fathoms water on the western edge of the bank between Basing island and pulo Dompa.

Tanjong Pinang peninsula, northward of pulo Dompa, was formerly Rhio island, separated from pulo Bintang by a creek, which is now filled up.

Rhio town, which stands on the north-west points of the peninsula, was a port with much trade; and although its importance has for many years declined, is still a place of considerable traffic for small vessels. The Dutch Resident, for Bintang and other islands, has his headquarters at Rhio, and, in 1900, the population of tanjong Pinang was 3,525, of which about 182 were Europeans. Lat. 0° 56′ N. Long. 104° 26¾′ E.

Crown Prince fort stands on a hill 70 feet above high water, which is situated southward of the town, and is partly planted with casuarina trees.

Piers.—There is a wooden pier, extending in a north-north-west direction from the town for a distance of 700 feet, which has a depth of 2 feet alongside its outer end at low water, spring tides; another wooden pier, extending from the western shore about half a mile southward of the above, is dry at low water at its extremity.

LIGHT.—A *red fixed* light is shown from the town pier end.

Communication.—The steamers of the Royal Packet Company, running between Batavia and Deli, call here fortnightly, and there is daily communication with Singapore.

Coal.—A small quantity of coal is kept at Rhio by the Netherlands Government, the coal stores being on Bajan island, situated two-thirds of

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

a mile to the eastward of Rhio, and here is a pier having 10 feet alongside at low water.

Shipping.—In 1902 the port was entered by 597 steam vessels.

Lat. 0° 55′ N. Long. 104° 25¾′ E.

Paku reef, of sand and rock, lying about half a mile off the western shore of Rhio island, is about half a mile in extent, and dries at low water, with a rock near its centre on which there is a single tree.

Channel.—The channel leading to the inner roadstead lies between Paku reef and the western shore of tanjong Pinang, and has a depth of 7 feet at low water, spring tides; at high water the reef is completely covered, with only the tree showing, and at that time there should be a depth of 14 feet in the shoalest part of the channel to Rhio.

Beacons.—The channel is marked on the eastern side by a white stone pyramidal beacon, 43 feet in height and 167 feet above high water, standing on the coast at about 3 cables northward of Batu Hitam, about one mile southward of the town of Rhio, and by a stake beacon surmounted by a ball a little south-westward of the pier head.

The edge of the shoal, on the western side of the channel, is marked by 3 stake beacons, surmounted by triangles.

Anchorage.—Vessels drawing from 12 to 13 feet water can enter the inner roadstead of Rhio, and there is good anchorage to the northward of the pier head in 2½ fathoms water, over soft muddy bottom; further eastward the water becomes rather deeper, and continues so up to, and beyond, Bajan island.

There is but little danger of grounding on the anchor, as it sinks so far into the mud.

Vessels unable to enter the inner harbour may anchor south-westward of pulo Penjengat; the soundings decrease gradually to the 3-fathoms contour line, and the bottom consists of soft mud.

Directions for approaching Rhio are given at page 628.

Tides.—It is high water, full and change, at Rhio at 9h. 50m., springs rise 7 feet, neaps 5 feet.

Lat. 0° 55¾′ N. Long. 104° 25′ E.

Pulo Penjengat, a hilly, thickly wooded island, and residence of the Governor or Viceroy of Rhio Linga, situated one mile westward of Rhio town, is about one mile in length, a third of a mile in breadth, and surrounded by a reef to the distance of a quarter of a mile.

Pier.—A pier, at which boats can lie at low water, is situated on the north-east side of the island and upon a hill, 193 feet above high water; at the west end there is a conspicuous tree.

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Pulo Sengarang, northward of tanjong Pinang, was at one time an island, but is now separated from pulo Bintang by a narrow channel filled up with mud, overgrown with mangroves, and almost dry at low water, but navigable for boats at high tide. The western extreme of pulo Sengarang projects some 3 miles to the north-westward of Rhio, affording shelter to small craft anchored off the town. There is a large Chinese village on the southern part of Sengarang, opposite to the town of Rhio, and between this and pulo Penjengat is a flat on which the depths are from 2 to 3 feet at low water. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Loz islet, half a mile westward of pulo Sengarang, is small, rocky and wooded, and low at the sides, but in the centre a hill rises to 82 feet above high water; the islet is surrounded by a narrow reef on which there are some rocks. Lat. 0° 57½′ N. Long. 104° 24½′ E.

Pulo Ujang, 60 feet above high water, is a somewhat flat island, overgrown with tall trees; it is separated from the south coast of pulo Bintang by a narrow, shallow channel, and on the south-east side of the island is Pengujan village. A bank of mud, sand, and rocks, that dries, extends about half a mile southward of the island, and a sandy spit nearly the same distance from the south-east point.

Bintang bay.—To the eastward of pulo Ujang, and to the northward of Sengarang, the coast recedes, forming Bintang bay, into which several small rivers empty themselves, the principal being the Bintang, the Charuk Baru, and the Gresik. Pulo Kapal and pulo Ketir are two low, wooded islets lying on a bank, that dries, on the eastern side of the bay.

With the exception of a narrow channel, from a quarter to nearly half a mile in breadth, with a depth of over 3 fathoms that commences abreast Penjengat island, and runs for a short distance into it, the bay is shallow; there are large fishing enclosures on the sides of the channel.

The Bintang river dries at its mouth, but has a depth of 3 fathoms inside, which, however, soon becomes less.

The Charuk Baru river, falling into the north-east side of the bay, has depths of from 3 to 4 fathoms for a distance of 3 miles from its entrance, with an average breadth of about 60 yards; higher up the river becomes narrower and shallower. The depth at the entrance is about 2 fathoms.

Gresik river, entering the bay northward of pulo Sengarang, is narrower and shallower than Charuk Baru river.

TERKOLEI ISLAND, situated 6 miles westward of the town of Rhio, is low, flat, sandy, and surrounded by a reef which in places extends nearly half a mile; it is about 6 cables in length in an east and west direction, overgrown with low trees, and has cocoa-nut palms on its

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

west side. The island stands near the middle of a shallow bank with from 3 feet to 3 fathoms water, composed of hard sand and mud, and 8 miles in length in an east and west direction. The eastern part of this bank extends to within half a mile of the reef surrounding Penjengat; and its western part to within half a mile of pulo Lobam with several patches, which dry at low water, and this portion is named Irene bank.

Lat. 0° 57¼′ N. Long. 104° 20⅓′ E.

LIGHT.—On the west point of Terkolei island an iron support, 42 feet in height and painted white, with dwelling near, exhibits, at an elevation of 46 feet above high water, a *white flashing* light showing flashes in *quick succession*, which should be visible, in clear weather, from a distance of 12 miles.

Shoals.—Nearly half a mile outside the 3-fathoms contour line, and S.W. ½ S., distant 1½ miles from the light support on Terkolei island, there is a shoal with 1¾ fathoms water over it, and, for a distance of about a mile westward of this, there are several patches on which the depths are from 4¾ to 5 fathoms.

Buoy.—A can buoy, painted black and surmounted by a truncated cone, marks the south-west side of the 1¾-fathoms shoal, and lies with Terkolei lighthouse bearing N.W. by N., distant 1½ miles.

Coast.—Between pulo Ujang and pulo Lobam the south coast of pulo Bintang is low and wooded, and has a bank extending off it, which dries at low water for a distance of a mile in places. Raja river, small and dry at its mouth, lies north-westward of pulo Ujang, and has the village of the same name on its west side of entrance.

Lat. 0° 59¼′ N. Long. 104° 11½′ E.

PULO LOBAM, situated about half a mile off the south-west part of Bintang, is a group of four or five small islands of about 2 miles in extent, separated by, at high water, narrow channels that are mostly dry at low water, when the whole appears as one island. The western portion is highest with two peaks, 342 and 268 feet above high water, and on the higher of the two there is a group of trees, one of which has a broad, flattened, conical top; the middle and eastern parts are lower and partly covered with mangroves. Pulo Lobam Kechil, the western islet, which is hilly and wooded, but lower than pulo Lobam, make from the northward as three peaks.

A reef, which is "steep-to," almost surrounds the group, and extends in places to the distance of one-third of a mile; on the northern side there is a narrow sandy beach and a village, and another village, the houses of which may be seen from the strait, is situated on the south side of the island.

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Dangers.—A reef, dry at low water, lies 2 cables south of the south-west point of pulo Lobam, and a shoal, with 2 fathoms water over it, lies about 4 cables from the south-east point. Chart, 2,413 [2,530]. Var, 1° 10′ E.

A rock, always visible, is situated on the reef north-westward of pulo Lobam Kechil, and, outside this, are three rocks which dry.

Isabella shoal, situated about a mile southward of pulo Lobam, is 7 cables in length, east and west, 2 cables in breadth, and has from one fathom to 2 fathoms water over it. A spit, with 3½ to 4 fathoms water over it, stretches from its eastern extreme nearly one mile in an east-south-east direction. The depths at a short distance from the south side of the bank are from 6 to 10 fathoms, but its western edge is steep, there being 11 fathoms close-to.

Buoys.—The east and west extremes of Isabella shoal are each marked by a can buoy, painted black and surmounted by a truncated cone, moored in about 3 fathoms water; they are about one mile apart.

Clearing marks.—Terkolei lighthouse bearing E. ½ N. leads to the southward, and Sau lighthouse, in line with, or open of, the west end of Lobam Kechil, about N.W. by N., leads well to the westward of Isabella shoal.

Orion rock, situated on the east side of the fairway, westward of pulo Lobam, is about 33 yards in extent, with a least depth of 16 feet, and 6 to 8 fathoms close around. It lies with the western point of pulo Lobam Kechil bearing E. ¾ N., distant 3¾ cables. Lat. 0° 59′ N. Long. 104° 13¼′ E.

A patch, on which the depth is 2¾ fathoms, lies north-eastward of Orion rock and about 2 cables off the reef fringing pulo Lobam Kechil, and W. ¼ N., distant 3¾ cables from the north end of that island.

Buoy.—A can buoy, painted black and surmounted by a staff and truncated cone, is moored, in 3 fathoms water, on the west side of Orion rock.

Clearing marks.—Pulo Sau lighthouse bearing northward of N.N.W. or West point (tanjong Uban) bearing North, leads westward, and the south-east extreme of pulo Lobam E. ½ N. leads southward, of Orion rock.

Karang Plasit (Dessa).—Karang Plasit, situated half a mile south-west of tanjong Batu, on the southern side of a shoal a quarter of a mile in extent, is a sandbank above water with a solitary tree upon it. Two patches of reef, together nearly a mile in length in a west-north-west and east-south-east direction, lie with their western extreme about 2 cables southward of Karang Plasit, and between these, and a reef with one fathom water over it, north-westward of pulo Lobam, there are charted depths of Lat. 1° 0¾′ N. Long. 104° 13¼′ E.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

4½ to 9 fathoms. A rocky patch lies 3 cables off the north-west side of Karang Plasit, and the same distance off-shore.

These dangers, which consist of sand and rock, are dry at low water and "steep-to," and between them and pulo Bintang there is a channel, from 2 to 3 cables in width, with depths of from 8 to 15 fathoms, continuing, with depths of from 10 to 16 fathoms, north-eastward of pulo Lobam; this channel leads into the strait passing between the shore reef eastward of pulo Lobam and Irene bank.

Pulo Lobam Kechil bearing S.S.E., or Bintang West point bearing eastward of North, leads westward of Karang Plasit.

Pulo Bua, about three-quarters of a mile in length, in a north-north-west and south-south-east direction, fronts the bay between tanjong Batu and West point, is thickly wooded, and with the exception of a round lump which rises in its centre is lower than the adjacent land; there is a remarkable white rock near its west side.

The island is bordered by a reef to the distance of about 1½ cables; two patches lie at that distance, south and south-east of the south point. The latter is a rock awash, and lies nearly in the middle of the channel between the island and the Bintang coast. At 3 cables northward of the reef fringing the north part of pulo Bua, and 2 cables from the Bintang coast, is a 3-fathoms patch.

Lat. 1° 4′ N. Long. 104° 13′ E.

WEST POINT (tanjong Uban) lies nearly abreast the light-house on pulo Sau, on the opposite side of the main strait, and distant about 2 miles. The point, which has tall trees on it, is moderately elevated land, presenting a round, shelving appearance, and from it the coast line trends north-eastward, forming the eastern side of the north entrance of Rhio strait; the point is bold-to on the south and west sides, but on the north a reef commences, which abreast Malang Senggera extends 3 cables off shore.

Coast.—From West point the coast has a northerly direction for 1¾ miles, then turns to the north-eastward for about the same distance to tanjong Kalumpang, and is generally wooded down to the water except for a small sandy strip running along it.

Malang Senggera is a ledge of flat rocks, which only covers at very high water, lying 2 cables off shore, at 1½ miles northward from West point. The reef fronting the shore extends one cable outside them, and at low water dry heads of rocks will be seen extending nearly as far as West point.

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Malang Ladi, a group of rocks lying half a mile north-north-westward of Malang Senggera, are always visible above water. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Malang Jarum is a small islet, covered with low trees, lying half a mile northward of Malang Ladi, on the edge of the reef fronting the shore, which here extends 5½ cables off.

Pulo Sekera (Dua), a small island, about 80 feet above high water, lies 2 miles north-eastward of Malang Jarum and close off tanjong Kalumpang. Lat. 1° 7½′ N. Long. 104° 14½′ E.

The shore reef which fronts the coast from West point extends a quarter of a mile outside pulo Sekera; thence to the eastward it blocks the whole of the large bight between pulo Sekera and tanjong Sebong.

A bank, with depths of from 1½ to 3 fathoms, and one spot having less than one fathom water, fronts the shore reef north of Malang Jarum; the 3-fathoms contour line, which marks its edge, trends from that islet in a north-east direction for 2 miles, and passes about half a mile outside pulo Sekera; from thence it trends just outside the Pap and a group of rocks eastward of it, with an irregular outline to tanjong Sebong. This bank between Malang Jarum and pulo Sekera is "steep-to," and must be given a good berth.

Netscher shoal, the outer part of which lies half a mile outside the bank just described, is about half a mile in diameter, composed of hard sand and coral, and has a patch, with less than one fathom water over it, on its north-west edge. From this shoal spot the west extreme of pulo Sekera bears S. by W. ⅜ W., distant 1½ miles. Close to the western side of this danger there are depths of 6 to 10 fathoms.

Crocodile shoal, a small patch of hard sand, with 3 fathoms water over it and 4½ to 8 fathoms around, lies N.E. ½ N., distant 2¼ miles from Netscher shoal, and with tanjong Sebong north extreme bearing E. ⅝ N., distant 2⅓ miles. There are several patches lying north-eastward and eastward of this shoal, the shoalest, distant about half a mile in an east-north-east direction, having a depth of 3¼ fathoms over it. Lat. 1° 11′ N. Long. 104° 16½′ E.

A rocky patch, consisting of three rocks, lies three-quarters of a mile south-westward of Crocodile shoal, with Outer rock bearing S. by E. ½ E., distant 9½ cables from the western rock; the two western, which are a cable apart in a west-north-west and east-south-east direction, have from 7 to 8 feet water over them, and the eastern, which is smaller, a depth of 13 feet; between the rocks the depths are from 6 to 7 fathoms.

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

About a quarter mile southward of it there is a patch on which the depth is 4 fathoms.

Clearing marks.—Pulo Sekera, bearing S. by W., leads westward of Crocodile shoal and of the rocky patch of 1¼ fathoms; and the northern extreme of tanjong Sebong, bearing E. ½ S., leads northward of Crocodile shoal.

Pulo Sau lighthouse, bearing S.S.W. ¼ W., leads westward of all the dangers northward of Malang Jarum.

SEBONG BAY, 6 miles wide, between pulo Sekera and tanjong Sebong, is nearly filled up with reefs which extend 2½ miles from the shore of the south-east part of the bay, where the Sungi Sebong Besar, the mouth of which is dry at low water, enters it; there are also several outlying rocks above water in the bay.

The shore of the bay is wooded close down, with a small sandy beach fringing it.

Lat. 1° 9½′ N. Long. 104° 16′ E.

Outer rock (Batu Senukuh), the farthest off shore of the rocks in Sebong bay, is about 10 feet above high water, and situated with the west point of pulo Sekera bearing S.W. ⅝ S., distant 2½ miles.

Batu Bunung (Pap), a rock which dries 6 feet, lies three-quarters of a mile, S. ¾ W., of Outer rock, just inside the 3-fathoms contour line of the shore bank.

An isolated rock, about 6 feet above high water, lies E. by S. ¼ S., distant half a mile from Outer rock; and at a third of a mile beyond in a south-east direction is Chapara rocks, a small group above water, close off the reef fronting the shore.

Anchorage.—There is safe anchorage in Sebong bay, in 4 fathoms water, over sand and mud, at about one mile E.N.E. of Outer rock.

Lat. 1° 11′ N. Long. 104° 18¾′ E.

Tanjong Sebong (Tanjong Tumbuk), the north-west extreme of pulo Bintang and the north-eastern limit of Rhio strait, is a rocky, wooded point. A small islet lies rather more than a cable westward of the point, and southward of this islet there is a rock on which are two cocoa-nut palms; S.W. by W., distant one-third of a mile from this islet is a sunken rock. Some islets also lie close to the coast south-eastward of tanjong Sebong.

Tides.—It is high water, full and change, at tanjong Sebong about 1h. 50m. before high water at Rhio or at 8 hours.

Tidal streams.—The tidal wave in the China sea comes from the northward, and, being divided by pulo Bintang, sweeps round its shores

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and flows into Rhio strait at both entrances, the stream from Singapore strait at the northern end, meeting that from the southward in the space between Chemara island and Rhio. Chart, 2,413 [2,530]. Var. 1° 10′ E.

In the northern entrance, on the western side, a portion of the flood stream, entering the strait, is deflected between Malang Orang and Pan reefs, and runs to the north-westward with the flood to Singapore, or in the reverse direction to the flood stream entering the main passage of Rhio strait; the ebb takes the reverse direction, circling southward of Pan reef, where it joins the main stream ebbing north-eastward. This must be guarded against when near Pan reefs.

The main body of the southern stream takes a general westerly direction for Dempu strait, much of it diverging to the southward through the channels dividing the several groups of islands lying between Mesana and Dempu, and a portion turning off to the north-west, in the direction of Karas; this last is joined by the streams flowing through the Siulung and adjacent channels, which gradually trend away to the north-westward after they enter Rhio strait.

The monsoons and currents of the China sea very much affect the regularity of the streams, which are strong, and at springs rush with considerable velocity through the channels among the islands, forming numerous eddies and stirring up the mud. In the narrow northern part of Rhio strait, about West point, this is particularly the case, the stream running from 3 to 4 knots, and sometimes even 4½ and 5 knots.

Buoyage.—Approaching Rhio from either entrance to the strait, buoys painted white and surmounted by a staff and ball mark the starboard hand, and can buoys surmounted by a staff and truncated cone the port hand; like all other floating marks they are liable to be adrift or out of position, so that too much dependence must not be placed in them. *See* Buoyage, Chapter I., page 36.

Directions.—From the southward.* —For steam vessels Rhio strait offers no difficulties, and no directions are necessary beyond keeping in the main fairway; the following directions apply chiefly to sailing vessels:—A vessel intending to proceed through Rhio strait should, from a position about 12 or 13 miles north-eastward of tanjong Jang, the eastern extreme of Linga island, steer about N.W. ½ N., which if care be taken to guard against the effects of the tidal stream (particularly the ebb, which sets strongly to the eastward), will take her to the fairway of the entrance to Rhio strait, and midway between Charts, 1,789 [2,531]; 2,413 [2,530]. Lat. 0° 10′ S. Long. 105° 10′ E.

* Continued from page 599.
General chart, 2,757 [2,554].

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Merodong and Gin peaks, which are visible in clear weather from a considerable distance.

In this track, if the course be duly preserved, the vessel will pass from 7 to 8 miles outside Crocodile rock, and 6 or 7 miles outside Pollux rock, which should not be approached under a depth of 12 fathoms, and will have soundings of 15 to 13 fathoms, until abreast that rock, when the depths will increase to 18 and 20 fathoms.

These depths will continue for 7 or 8 miles, when they will suddenly decrease to 12 or 10 fathoms, on the sandbank which trends north-eastward from Mesana island, right across the approach to the strait. The depths upon this part of the bank appear to be irregular, and it would seem that a vessel might get a cast of 19 or 20 fathoms when crossing it. After this bank is crossed the depths will increase to 14 or 15 fathoms, and continue so for 3 or 4 miles, when they will again become irregular, varying from 10 to 18 fathoms, until abreast of pulo Gin.

At night or in thick weather, a vessel, from a position about 13 miles north-east of tanjong Jang, should steer a N.N.W. ½ W. course for about 25 miles, and then N.W. ½ W. for about 30 miles, which, if proper allowance has been made for the tidal stream, will pass about 11 miles eastward of Pollux shoal to the fairway of the entrance to Rhio strait, with pulo Gin on the starboard beam.

Some difficulty has at times been experienced by strangers in recognising the entrance to Rhio strait, on account of the numerous islands in its vicinity. The high conical peak of Merodong (*see* pages 594, 601) should be made out as soon as possible, that being the first conspicuous object on approaching the strait, and if this can be discerned no difficulty will be found in making out the other points as the vessel proceeds.

Lat. 0° 36′ N. Long. 104° 18½′ E.

Pulo Rondo or Dempu, the small round island on the west side of entrance of the strait with Tafelbirg or Table hill on pulo Galang, South-west hill on Siulung, pulo Telang, and pulo Gin, with a flat peak near its centre, will, at a distance of 14 miles, readily show the approach to the strait; whilst, at a nearer distance, Little Karas lighthouse, the Tapais, Alligator, and other islands, cannot fail to point out its entrance.

Having brought the south end of pulo Gin abeam, shape course for Little Karas island lighthouse, which should be passed about one mile distant, to avoid the Rotterdam and Tapai island reefs to the eastward.

From abreast Little Karas, shape course through the fairway to pass about one mile westward of pulo Lobam, a distance of 17 miles; observing that the east end of East Mubut bearing S. ½ E. or southward of that

General chart, 2,757 [2,554].

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bearing, until the north extreme of Sembulang point bears southward of W. by S., leads eastward of the 4¾-fathoms patch near the fairway. Chart, 2,413 [2,530]. Var. 1° 10′ E.

To avoid Orion rock, the south-east end of pulo Lobam group should not be brought to bear eastward of E. ½ N. until Sau lighthouse bears N.N.W., or West point bears North, which will lead in the fairway westward of the rock. Steer with West point bearing North, until abreast the south end of pulo Bua, to pass between it and the patch of 4 fathoms off pulo Sau; then alter course to pass a half or three-quarters of a mile westward of West point, from abreast which steer to pass eastward of Pan reef beacon.

The mark for passing eastward of Pan reef is pulo Sau lighthouse, bearing S. ½ W., or Barbukit hill on the Malay peninsula, westward of North. A vessel will be clear of the Pan reefs when pulo Nongsa opens of tanjong Nongsa, W. ⅝ N., and may then shape course as necessary for Singapore road. If the stream be setting to the westward care should be taken in a sailing vessel, especially in light or contrary winds, to get well over on the northern side of Singapore strait; to avoid being set to the westward of St. John islands, from which it would be difficult to fetch into Singapore road, or to anchor, owing to the great depth of water. Chart, 2,403 [2,525].

The channel westward of Pan reef is used by the pilots in preference to the channel eastward of it (*see* page 609, and Tidal streams at page 622). Sau lighthouse in line with the east extreme of Nginang Kechil bearing S. ⅝ E. leads through nearly in mid-channel between the reefs. For directions to Singapore, *see* page 262.

Working through Rhio strait from the southward.—It seldom happens that a vessel will have to work along near the islands from Mesana to Dempu point; it is generally found advantageous to stand to the northward, in case of meeting with a north-westerly wind. But it may occasionally happen that a vessel will derive advantage by standing towards them; in which case, when standing towards the north side of Mesana, avoid bringing the summit of Binan northward of W. ½ N. which will clear the 2½-fathoms shoal north-eastward of the east point of the former island. *See* page 594.

To clear Rifleman shoal, lying 1¼ miles eastward of Binan, the eastern extreme of Mesana must not be brought eastward of S.E. ¼ E., or the northern extreme of Katang Linga northward of W. by N. ¼ N. This last bearing also clears the 3½ to 4 fathoms bank off the northern part of Binan. Lat. 0° 28¾′ N. Long. 104° 28½′ E.

Katang Linga may be approached to the distance of half a mile, and the Selanga islands and Udik to within a moderate distance, but vessels should not stand within a line drawn from the north extreme of

General chart, 2,757 [2,554].

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

Katang Linga to the north Selanga, nor within another drawn from the last-named island to Udik.

Standing to the westward, towards the south end of pulo Galang, a vessel may approach Great bank and East bank to a depth of 10 fathoms. Pulo Rondo or Dempu bearing S.W. by S. leads south-eastward of these banks, and is a safe turning mark.

Lat. 0° 36′ N. Long. 104° 18½′ E.

Between Dempu point and Little Karas a vessel may stand into a depth of 8 fathoms; but to avoid Dittlof reef, Chirum point, the eastern point of Galang, must not be brought to bear southward of W. ½ S. until Little Karas lighthouse bears westward of N.W. Little Karas should not be approached nearer than a quarter of a mile, nor Great Karas than half a mile, to avoid their reefs.

Between Great Karas and East Mubut island, a vessel may stand into a depth of 8 fathoms; Little Karas well open of Great Karas, bearing S.E. ½ S., is a good turning point to avoid the bank off Great Karas; pulo Lobam Kechil open of East Mubut island, N.N.W. ½ W., clears the bank extending southward of East Mubut.

After passing East Mubut, its eastern extreme must not be brought to bear eastward of S. by E. ½ E. until the southern extreme of Sembulang point bears W. by N. ½ N., to clear the bank which extends north-west of East Mubut; thence to avoid the 4¾-fathoms patch off Sembulang point, keep the east end of East Mubut bearing southward of S. ½ E. until the north extreme of Sembulang point is southward of W. by S.

The bay between Sembulang point and Chemara bank is apparently free from danger, and a vessel may stand in until pulo Lobam Kechil bears N. by W.; to avoid Chemara bank, keep West Mubut just open of Sembulang point, S.S.E.

Chemara Kechil should not be approached nearer than half a mile, as the fringing reef is "steep-to." After passing this island, Sembulang point should be kept open of it, bearing S.E. ¾ S., to avoid Johannes shoal and the reef extending from pulo Antu.

To avoid Nginang reef, keep pulo Sau lighthouse well open of pulo Nginang, bearing N. by W.; and to clear the reef fringing that island, keep the north-east point of Nginang Kechil open of the eastern extreme of pulo Sau, N. by W. ½ W.; this will lead clear of the reefs and westward of the 4-fathoms patch, as far as the eastern extreme of pulo Sau, which should not be approached nearer than half a mile on account of the small reef lying a quarter of a mile south-east of the lighthouse. West point, bearing North, leads eastward of the 4-fathoms patch.

After passing Nginang Kechil, in standing to the westward, keep pulo Sau lighthouse open eastward of Nginang Kechil, bearing S. ½ E.;

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this will lead clear of Van Gogh's island shoals and of the 4-fathoms patch south-eastward of Malang Orang. Chart, 2,413 [2,530]. Var. 1° 10′ E.

Tanjong Sau (on pulo Batam), bearing westward of S.W. ¾ W., leads southward of Pan reef; Barbukit hill, kept westward of North, or pulo Sau lighthouse westward of S. ½ W., until Johor hill bears N.N.W. ½ W., leads eastward of that danger; and pulo Nongsa open of tanjong Nongsa W. ⅝ N., leads northward of it.*

In working between Pas-op and Pan reefs, keep tanjong Sau well open of tanjong Malang Orang, bearing S. by W., or the eastern extreme of Ngiuang Kechil southward of S. ⅞ E., in order to avoid the reef extending about 6 cables from the Batam shore.

Standing to the eastward, towards pulo Telang, at the southern entrance of Rhio strait, be careful to give the southern-eastern side of that island a berth of 2 miles, and to keep South-west hill, on Siulung island, well open of Telang, bearing N.W. by W., to avoid Hendrik Jan rock. Tanjong Punggung, the south-west point of Siulung, and Alligator island may be approached to half a mile. Lat. 0° 44¾′ N. Long. 104° 31′ E.

When nearing the Tapai islands, South-west hill kept well open of the southern point of Alligator island, bearing E. ¾ S., will lead southward of those dangers and of Rotterdam reef, in about 4½ fathoms water; the south-western extreme of pulo Pankel kept northward of N.W. ½ N. leads westward of Rotterdam and Dutch shoals.

To clear the bank of 4 to 5 fathoms, extending 2½ miles southward of the Tapai islands, Siulung hill must be kept open of South-west hill, bearing E. by N. ¼ N., until the summit of pulo Lobam is open westward of pulo Pankel, N.W. by N.

The south-west end of Pankel should not be approached nearer than half a mile, as its reef is "steep-to"; the west side may be neared to 7 or 8 fathoms, but off its northern end keep Little Karas lighthouse open of pulo Pankel, bearing S. by E. ⅜ E., to avoid the shallow water extending N.N.W. from it.

Between pulo Pankel and Isabella shoal, a vessel may stand to the eastward into depths of 8 or 9 fathoms; but should not bring the north-east extreme of pulo Pankel to bear to the southward of S.S.E., or Terkolei lighthouse to the westward of N. by W., to avoid Suri reefs. Terkolei lighthouse bearing E. ½ N. leads southward of Isabella shoal, and pulo Sau lighthouse in line with the west side of pulo Lobam Kechil N.W. by N. clears it, passing to the westward; the south-east extreme of pulo Lobam group, bearing northward of E. ½ N. until pulo Sau lighthouse bears northward of N.N.W., leads southward and westward of Orion rock.

General chart, 2,757 [2,554].

* Barbukit hill may be recognised by the low land adjoining it, whilst Johor hill terminates abruptly to the westward.

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Chart, 2,413 [2,530]. Lat. 1° 0′ N. Long. 104° 12¼′ E. Var. 1° 10′ E.

When northward of Orion rock, the western extreme of Lobam Kechil should not be brought to bear southward of S. by E. ¾ E. until tanjong Batu bears East, which will avoid the dangers near Karang Plasit. Tanjong Batu is "steep-to"; and both it and pulo Bua may be approached to about 3 cables, except near the extremes of that island. West point is bold, but the shore northward of it, to Malang Jarum, must not be approached nearer than half a mile.

Northward of Malang Jarum there are depths of 7 and 8 fathoms close to the edge of the shallow bank which fronts this part of the coast to the distance of nearly one mile. This bank and also Netscher and Crocodile shoals and the shoal between them will be avoided by keeping pulo Sau lighthouse bearing southward of S.S.W. ¼ W.

If pulo Sau lighthouse cannot be made out after pulo Dua bears southward of East, Malang Jarum island—which will be seen well clear of the extreme of the land as Netscher shoal is neared—must not be brought westward of S. by W. ¾ W., until Pan reef beacon bears W.S.W., or tanjong Sebong north extreme E. ½ S.; a vessel will then be northward of those dangers and in Singapore strait.

Chart, 2,403 [2,525].

Through Rhio strait from Singapore.—Vessels leaving Singapore at high water, or about the first quarter of the ebb, and taking about 4 hours to reach the entrance of Rhio strait, will probably carry a fair tidal stream through both straits; but no dependence can be placed on it. (*See* Tides and Tidal streams, pages 616, 622.)

The flagstaff on fort Canning, Singapore, bearing West, leads 2 miles southward of Johor shoal; and when Johor hill bears North, a vessel will be eastward of the shoal. Entering Rhio strait, pass between Pas-op reef buoy and the screw pile beacon on Pan reef; or, in a vessel of heavy draught, pass eastward of the Pan reef beacon, with Barbukit hill bearing N. ¼ W.

The directions previously given for coming from the southward, if reversed, will suffice for proceeding southward.

Chart, 2,413 [2,530].

By **night.**—Pulo Sau light bearing S. ¾ W. clears Pan reef, passing to the eastward and the leading lights on pulo Tunjuk, in line, bearing S. 2° E. lead down in mid-channel of the strait.

Terkolei island light open southward of pulo Lobam, bearing about E. ¾ S., clears Orion rock, when a south-easterly course may be steered till Little Karas island light bears S.S.E. ⅓ E. when it may be steered for.

To Rhio anchorage from the southward.—Vessels bound to the anchorage off Rhio, having entered the strait (*see* page 623) should

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steer for the Tapai islands till within about 3 miles of them; then course should be shaped to pass between the buoys marking Rotterdam reef and the reef 1½ miles north-westward of it. (There is also a good channel unbuoyed, between the Tapai and Alligator islands, close westward of the latter.) Thence between the buoy south-west of pulo Dompa and the buoy marking the reef eastward of Suri island, avoiding the patch of 4¾ fathoms eastward of the latter; and when the whole of Loz island is open westward of pulo Penjengat, bearing North, steer for it, to the anchorage described on page 616.

Chart, 2,413 [2,530].
Lat. 0° 46¾′ N.
Long. 104° 25′ E.
Var. 1° 10′ E.

The channel between Paku reef and the shore of tanjong Pinang is beaconed and available for small craft with local knowledge. (*See* page 615.)

To Rhio anchorage from the northward. — Having entered Rhio strait, as directed at page 628, and reached a position southward of Orion rock, a south-easterly course should be steered, keeping pulo Sau lighthouse open of Lobam Kechil, bearing N.W. by N., until Terkolei lighthouse bears E. ½ N., to pass southward of Isabella shoal; thence steer midway between the reefs southward of Terkolei and Suri reef, to the anchorage in the road.

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CHAPTER XII.

BERHALA AND DURIAN STRAITS.

Chart, 2,757 [2,554]. Var. 1° 5′ E.

GENERAL REMARKS.—Sailing vessels, bound from Banka strait to Singapore during the strength of the north-east monsoon, frequently adopt the Inner route by Berhala and Durian straits. During the prevalence of strong northerly winds in the months of December and January they will save much time doing so, for these straits have smooth water, good anchorage, and but little tidal stream, whereas on the eastern side of Linga, at this season of the year, there is generally a heavy sea and a southerly current sometimes running at the rate of 3 knots an hour. In Berhala strait, sailing vessels will also be greatly assisted by the squalls from the Sumatra coast.

Berhala strait is situated at the southern part of this route, and Durian strait at its northern part; the intermediate portion has not received a specific denomination. The entire route is about 120 miles in length from pulo Berhala to Karimon islands, and is bounded on the western side by the coast of Sumatra, False Durian, and the contiguous islands; and on the eastern side by Singkep and other islands off the south and west coasts of Linga, and by Great and Little Durian and the adjacent islands.

There is deep water in the fairway throughout, but it has not been closely surveyed.

Winds, *see* pages 30, 598.

Chart, 1,789 [2,531].

SUMATRA COAST.—Tanjong Jabong.—The coast of Sumatra from Batakarang point to tanjong Jabong has been described at page 583. Tanjong Jabong, the south-eastern limit of the Inner route, is conspicuous and partly overgrown with high, and on the extreme of the point with low, trees. Like most other parts of the east coast of Sumatra, it is low land, and has a mudbank extending many miles north-west and south-east of it.

Lat. 0° 51½′ S. Long. 104° 24½′ E.

ISLETS and DANGERS.—Berhala (Varella) is a small rocky island, covered with high trees, having a hill on its western part, 443 feet above high water, which has two summits of nearly equal height, and may be seen from a distance of 20 miles in clear weather; some Malay fishermen live on the island. It lies in the middle of Berhala strait, with tanjong Bong bearing S. by W. ¼ W., distant 10 miles.

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Except on the west side, the island is surrounded by a reef which dries at low water, and extends for a distance of 2 cables from the south-east side. Chart, 1,789 [2,531]. Var. 1° 5′ E.

A bank, with depths under 5 fathoms, extends about 1½ miles east, one mile north and south-east, and about half a mile south and west of the island, and on it are several islets and rocks, the largest of which, Anak Berhala, is a small, wooded islet, about 5 cables north-eastward of it; about 3 cables northward of Anak Berhala are some rocks above water, also others which dry at low water. Between the dangers north-eastward of Berhala and Middle rocks there is a channel 2 miles wide, with depth of from 10 to 16 fathoms. Fully half a mile northward of the outside rock near the north-east point of Berhala there is a rock which dries 5 feet at low water.

Landing may be effected at high water at a sandy beach on the north side, but it is easier on a small sandy beach on the west side.

Anchorage. — Water. — There is anchorage on the west side of Berhala, in from 7 to 8 fathoms water, at fully half a mile from the shore; if anchoring off the north side care must be taken not to go far to the eastward, as a rock which dries at low water, lies 4 cables northward of the north-east point.

Middle rock, partly dry at low water, lies 3⅔ miles N.E. by N. from Berhala, and a small rock, with 2 fathoms water over it, and "steep-to," is situated N.N.W. ⅞ W., distant 3½ cables from it, which has a depth of 9 fathoms close-to, and deep water around it. Lat. 0° 48½′ S. Long. 104° 26¼′ E.

Another rock is reported to exist at a considerable distance eastward of Middle rock, but its position has not been determined.

Pollux rocks consisting of two, just awash at low water, lie in an E. by N. and W. by S. direction and 2 cables apart; the eastern rock is situated N.E. ¾ E., distant 1 4/10 miles from Middle rock.

There are depths of from 4 to 14 fathoms between, and around, them; they are not distinguishable by breakers, but only by a line of ripple, during the strength of the tidal streams.

CAUTION.—Until the fairway between Berhala and Singkep Laut islands has been thoroughly examined, it must be navigated with great caution.

Berhala strait, the channel southward of Berhala island, being wider and free from danger, is consequently more frequented. The shallow bank projecting about 8 or 9 miles north-westward from tanjong Jabong forms an elbow, which will be avoided by keeping tanjong Jabong bearing southward of S.E. ½ S., until Berhala island bears eastward of E.N.E.

SINGKEP, the largest of islands forming the north side of Berhala strait, is about 21 miles in extent, and of irregular shape. Baru bay, about

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Chart, 1,789 [2,5 11]. Var. 1° 5′ E.

3 miles deep, lies between its two southern points. On the eastern side of the island is a range of hills, of which mount Lanjut, 1,688 feet above high water, is the highest summit. There is a hill over tanjong Buku, and 3¼ miles to the northward on the west coast of the island is mount Porok, of moderate elevation. From tanjong Buku the coast trends in a northerly direction for 14 miles to tanjong Sebayur on the east side of the entrance to the strait of the same name: rocks above and below water front the whole of it, to the distance of one mile.

Tanjong Buku, the south-west point of Singkep island, is known by a hill with two peaks, the eastern and higher being 450 feet above high water, and nearly 3 miles northward is mount Porok, 495 feet above high water and having a sharp peak.

Tanjong Sebayur, the west point of the island, is also hilly; mount Mentigi, on the southern side of the point, is 365 feet, and about 5 miles eastward of it mount Bidei is 684 feet, above high water.

The river Marok, which is small, runs into the sea south-eastward of tanjong Sebayur, and has on its bank Marok village; it and Chukas village, 7 miles to the northward, are the two principal on this coast.

The population, consisting of Malays and Chinese, is about 25,000, and pepper, gambier, some rice and fruit are cultivated.

Lat. 0° 39½′ S. Long. 104° 14¼′ E.

Serak island, low and wooded, and lying 7½ miles, W. by N., of tanjong Buku, is situated on a bank, which under the depths of 5 fathoms extends 2 miles south-east, a mile north-west, and about three-quarters of a mile off the other sides. Ukol islet, about half a mile, W. by S., of the south point of the island, lies on this bank, as do also several islets and rocks.

A shoal, with 3½ fathoms water over it, lies W. by N., distant 1½ miles from the north point of Serak island.

Pengalap islet, low and wooded, lies about 3 miles north-north-eastward of Serak island, on the eastern edge of a steep reef which extends 2 miles north-westward, and fully a mile south-eastward of it; the islet is surrounded by rocks and stones overgrown with vegetation.

A shoal, with 3½ fathoms water over it, lies 2¼ miles eastward of Pengalap islet.

Lat. 0° 38½′ S. Long. 104° 19¼′ E.

James rock, a pinnacle, lies on the eastern side of the channel between Serak island and Singkep, with cape Buku bearing S.E. ⅛ S., distant 3½ miles; some other rocks lie between James rock and the shore of Singkep island. A shoal ridge, 3 miles in length in a north-west and south-east direction, with 4¾ fathoms water over it, lies about 2 miles north-eastward of, and parallel to, the bank surrounding Pengalap islet, and a similar ridge, but 4 miles in length and with depths of 4½ fathoms over it,

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lies north-westward of the preceding, its southern point being distant from it about $1\frac{1}{4}$ miles. Chart, 1,789 [2,531]. Var. 1° 5′ E.

Speke rock, which lies with the north extreme of Serak island bearing E. by S. $\frac{5}{8}$ S., distant $8\frac{2}{3}$ miles, is circular, about half a cable in diameter, and uncovers at two-thirds ebb, showing as a small black rock about the size of a boat, and has depths of 8 fathoms close-to. Tanjong Buku open to the southward of Serak island, bearing E. $\frac{3}{4}$ S., leads southward of the rock, and Muju island bearing N.W. by N. leads to the south-westward. Lat. 0° 36½′ E. Long. 104° 6′ E.

There is a passage, between Speke rock and Serak island, avoiding the $3\frac{1}{2}$-fathoms patch north-westward of the latter; also between Speke rock and Alang Tiga islands avoiding Atkin rock. The depths charted in this passage are from 6 to 8 fathoms, over muddy bottom, and in some places sand; but the channel westward of Alang Tiga islands is preferable.

LIGHT BUOY.—A light buoy, painted red and black in horizontal bands and exhibiting a *white occulting* light, with a period of system of *twenty seconds,* showing light for *ten seconds* followed by an eclipse of *ten seconds,* is moored on the south-eastern side of Speke rock.

Alang Tiga islands, lying about 30 miles north-westward of Berhala, form a group of five small, thickly wooded islands, and some rocks above water. The three principal islands are high, Muju being 270, Alang Tiga island 258, and Berhala island 226, feet above high water, and may be seen from a distance of about 25 miles in clear weather, and the others from about 14 miles. They may be passed at a prudent distance on their western side, the depths being mostly from 6 to 8 fathoms, over mud, in the fair channel. In working, the coast of Sumatra may be approached to 6 fathoms water, and from this depth to about 8 fathoms towards the islands, is a fair track, although the depths are not always regular.

Atkin rock, a small pinnacle, circular in form, about 100 feet in extent, uncovers at two-thirds ebb, and is "steep-to"; when covered, unless the tidal stream is running strongly, there is no indication of it. Round the rocks there are depths of from 4 to 8 fathoms over sand and mud. The marks given for the rock are, the west extreme of Berhala island, just shut in by the east extreme of Alang Tiga island, bearing N. $\frac{7}{8}$ W., and the south extreme of Muju island, bearing W.N.W., distant three-quarters of a mile. Lat. 0° 32½′ S. Long. 104° 2½′ E.

Posek islands.—The principal islands of this group, which lies off the north-west side of Singkep island and is separated from it by Sebayur

General chart, 2,757 [2,554].

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Chart, 1,789 [2,531].
Lat. 0° 25′ S.
Long. 104° 12½′ E.
Var. 1° 5′ E.

strait, are Mandara, Posek, Rusuk Buaja, Nibung, Panjang, and Noja. The whole group are of little importance and sparsely populated. Mandara is hilly and thickly wooded; Posek, the centre island, is hilly, but runs down low near the coast, and on its northern side is the largest village of the group; and Rusuk Buaja is thickly wooded and hilly.

Nibung is hilly and has a village on its western side; a small wooded islet lies on a drying reef that extends 7 cables north-north-westward of the island.

Panjang is also hilly and slopes down to a low shore, and, on its south point, there is a village inhabited by Malays and Chinese; on a drying reef, that extends fully half a mile from the north point, lies Buding islet, and a rock that is visible at high water.

Noja, hilly and only inhabited on its southern side, has a reef which dries, extending north-eastward of it, on which is Penganak Noja islet, and at the extremity of the reef, inside the 5-fathoms contour line, there is a rock awash; westward of Noja, on the reef extending from it, is Sek, a wooded islet.

The principal channel is Selat Membachang, between Mandara and Posek islands, and on the eastern side there is a fairly broad channel in which the depths are more than 5 fathoms.

SEBAYUR STRAIT, between the north-east side of Singkep and the Posek group, is a good channel, but requires local knowledge or the assistance of a pilot; it is entered, from the southward, between tanjong Sebayur and a shoal that extends about 4 miles southward of Mandara island, on which are some patches that dry. Tanjong Irat is situated 5½ miles north-north-eastward of tanjong Sebayur, and between the strait is divided by a long, steep sandbank on the north point of which lie two rocks, named Malang Bang, only visible at high water; a patch that dries lies on its western elbow about midway between the two points.

Both channels are navigable, but the western is the broader of the two.

About 1½ miles southward of tanjong Irat is Chukas island and the river of that name, the bar of which is nearly dry at low water; there are depths of from one fathom to 4 fathoms in the river, which is only navigable for boats. Rapang islet, one mile north-westward of tanjong Irat, forms, with that point, the northern sides of the entrance to the strait.

Lat. 0° 18½′ S.
Long. 104° 7′ E.

Silenseng island consists of two islets connected by a reef dry at low water; it is surrounded by a reef which extends half a mile from the west side, and 3 cables eastward of the south point lies a conspicuous rock, not seen at high water.

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A shoal on which the depth is 5½ fathoms, over sand, lies E. by N. ⅝ N., distant 3 miles from the north point of the island. Chart, 1,789 [2,531]. Var. 1° 5′ E.

Buntar, a wooded islet composed of stones, lies 2 miles northward of Silensang, and is surrounded by a reef which extends a quarter of a mile off in places. Lat. 0° 16′ S. Long. 104° 7¼′ E.

JAMBIE BAY.—From tanjong Jabong (page 630) the coast of Sumatra trends sharply to the westward, forming Jambie bay and the delta of the Jambie river; this coast is fronted by a mudbank which in places extends fully 5 miles off.

Jambie river, the largest river in Sumatra, has two principal mouths, named Kwala Niur and Kwala Berba, and above, where it separates into these two branches, is known as the Batang Hari river; the other mouths are Ayer Itam, Sadu, Pengusiran, Lambur, Alang Alang, and Lagan rivers.

Steam vessels ascend the river for a distance of 330 miles and boats about 100 miles further; the delta of the river is low and marshy.

Kwala Berba, the eastern of the principal mouths of the Jambie river, about 10 miles westward of tanjong Jabong, is fronted by banks which dry, or nearly so, at low water, and the two Berba islets, which, as well as the coast, are covered with high trees; between the islets there is a small channel, with depths of from 2 to 4 fathoms, which on the north side has no outlet over the bank. Lat. 1° 4′ S. Long. 101° 12½′ E.

Two channels run in an east-north-east and west-north-west direction from the mouth of Kwala Berba, the former gradually shoaling to the drying reef outside; in the western the depths are irregular in some places, being not more than 2 to 3 feet at low water, so that this channel is difficult to navigate; the least depth in the entrance at low water is 6 feet.

Several roots of trees lie on the drying bank northward of the islands, and the 5-fathoms contour line which is "steep to" to tanjong Jabong is 4 miles northward of this mouth of the river.

Kwala Niur, the western mouth, has usually a depth of 8 feet at low water, but is subject to change. On the western side the bank, which partly dries at low water, consists of hard sand, and on the eastern of soft mud. The entrance is about a mile in breadth. Lat. 0° 58′ S. Long. 103° 49′ E.

Buoys.—A beacon buoy, painted black and surmounted by a staff and ball, is moored at the navigable entrance of the Kwala Niur, about N. ¼ W., distant 5 miles from tanjong Solok, on the western side of the entrance; within this buoy, the channel is marked on the starboard hand by 4 conical buoys painted white, and, on the port hand, by 5 can buoys painted black.

Pilots for the Jambie river may be obtained, but their employment is not compulsory.

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Chart, 1,789 [2,531]. Var. 1° 5′ E.

Towns.—There are several towns and villages on the banks of this river. Muara Saba, 9 miles from the mouth, where the director of customs is stationed, is a small village of 200 inhabitants; the river is here about 80 yards in breadth, and anchorage may be obtained in 3 fathoms water. Simpang Muda and Simpang Tua are villages, 24 miles above Muara Saba, near the junction of the Niur and Berba branches.

Muara Kompeh, about 6 miles from Simpang Muda, is a somewhat important trading place, and here the river is about 100 yards wide with depths of from 3 to 4 fathoms, but higher up are several patches with not more than 3 feet over them.

At Jambie, about 37 miles above Muara Kompeh, there are buildings on both sides of the river, but the European settlement is on the right bank.

Communication.—Every alternate week the Royal Packet Company's steamer, which runs weekly between Batavia and Palembang, proceeds from Palembang, *viâ* Muara Saba and Simpang, to Jambie and back *viâ* the same ports.

Trade.—The ground is very fertile, and the principal crop is rice; gambier, tobacco, honey, rattans, and india-rubber are also exported. In 1902 the port was entered by 53 steam vessels.

Tides.—*See* Kwala Lajau, page 638.

The highest water in the river is from October to March, with highest river in February and lowest in June and July; the difference between the highest and lowest water amounting to about 4 fathoms. Above Jambie the tidal streams run from 2 to 3½ knots an hour.

COAST.—Westward of the Kwala Niur the coast is low and marshy, with behind some hills not more than 70 to 100 feet above high water; several rivers, of no importance to shipping, run into the sea, and the coast is sparsely populated.

Lat. 0° 47½′ S. Long. 103° 30′ E.

Sungi Tongkal, 42 miles north-westward of Kwala Niur, has a least depth of 5 or 6 feet on the bar at low water, spring tides, and a vessel drawing 10½ feet has crossed it; Tongkal village, situated on the right bank of the river, is fully 2 miles within the entrance.

About 30 miles from the entrance, near Rumahan village, the river is fully 100 yards in breadth with depths of from 3 to 8 fathoms, and 9 miles above this, near Tebing Tinggi village, there is from 3 to 6 fathoms water, above which the river becomes shallower, with snags.

The banks of the river, low and monotonous, are covered with nipa palm and sparsely populated, but further up they become higher and hilly.

From the northern entrance point, a bank, which dries, extends first in an east-north east direction and then surrounds tanjong Labu, northward of the entrance, drying nearly 1½ miles north-eastward of that

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point; a bank which dries also surrounds the southern entrance point to a distance of about a quarter of a mile. Chart, 1,789 [2,531]. Var. 1° 5′ E.

Anchorage.—Good anchorage may be obtained off Tongkal village, in from 2½ to 3 fathoms water, about 1½ cables from the shore. The bar is crossed with the river entrance well open, bearing S.W. ½ W.

Tides.—*See* Kwala Lajau, page 638.

Reteh river discharges by four mouths at from 8 to 12 miles northward of Sungi Tongkal; they are named Terap, Tenga, Ujan, and Patah Parang, and are formed by Ruku, Kijang, and Puchuh islands. Off these mouths the 3-fathoms contour line is 5 miles from the coast, and the channels which lead to them are between drying mudbanks extending to the eastward from the islands. Unless having local knowledge, or by previously buoying the channels, these mouths are difficult to navigate, with the exception of the Kwala Ujan, which may be entered by bringing its somewhat conspicuous south point to bear W. ¼ S. and steering for it; the depths in the entrance should be from 15 to 16 feet over a muddy bottom.

Anchorage may be obtained off Kota Baru or Reteh village in 3 fathoms water; this village is about 36 miles from the entrance.

INDRAGIRI RIVER.—Sapat Dalam, one of the outlets of the Indragiri river, is half a mile broad at the entrance and has general breadths of from 2 to 4 cables; the least depth in mid-channel is 2¼ fathoms. Lat. 0° 32′ S. Long. 103° 26′ E

At 1½ miles within the entrance, on the western side, is the entrance to the Sungi Enok, 15 miles from which is the village of the same name; the depths in this river are from 1¼ to 3¼ fathoms.

The Sungi Niur, entered 7 miles further north-westward on the same side, has depths of from 3½ to 10 fathoms in mid-channel with breadths of from 2 to 4 cables, the banks being covered with nipa.

The best channel into Sapat Dalam is between a bank that dries and extends 8 miles eastward of tanjong Laut, the south-east point of Niur island, and a drying bank 7 miles in length with a greatest breadth of 2 miles, which lies, in an east and west direction, southward of tanjong Laut.

Kwala Lajau, the principal entrance to the Indragiri river, must be navigated by the aid of the compass and lead, as there are no landmarks and the coast is everywhere thickly wooded. Lat. 0° 25′ S. Long. 103° 36¼′ E.

The entrance channel has a westerly direction between the mudbank, which dries for a distance of 2 miles southward of Baso island, and a drying mudbank, continued by a shoal which extends nearly 7 miles eastward of the east point of Niur island.

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Chart, 1,789 [2,531], Var. 1° 5′ E.

Bela village, on the south side of Baso island, and about 11 miles westward of tanjong Bakau, is built upon piles and has a population of about 600, who live by fishing.

The Kwala Lajau has an average breadth of about 6 cables and depths of from 4 to 9 fathoms, but a bank named Cuhorn, about one mile in length in an east and west direction, by 1½ cables in breadth and with from 1¼ to 1½ fathoms water over it, lies in the channel between the outer banks.

Lat. 0° 22′ S. Long. 103° 26½′ E.

About 11 miles inside the entrance on the north bank is the Kwala Terbung, used by junks proceeding to Amphitrite bay, and 7 miles further on the north bank of the Indragiri river, is the Custom house at Sapat Dalam.

Ringat, the chief town of Indragiri, and residence of the controller, is 85 miles from the entrance and built on both banks of the river, the most important part being on the right bank; it has a trade in rice, sago, tobacco, and Liberian coffee.

There is a tide gauge at Ringat, and from observations the average depths in the months of the year are as follows:—January, 15 feet; February, 12 feet; March and April, 15 feet; May, 12 feet; June, 6 feet; July, 5 feet; August, 6 feet; September and October, 9 feet; November, 12 feet; and December, 13 feet.

Vessels of 7 feet draught proceed to Ringat during the dry season, but under some conditions cannot reach beyond Chenako, about 45 miles from the entrance; at other times vessels ascend to Pranap, a village about 55 miles above Ringat, and beyond this those of 6 or 7 feet draught steam for 4 hours to Charantei village.

Tides.—In Kwala Lajau the tides are of a semi-diurnal character subject to diurnal irregularities.

Springs occur nearly two days after full and change of the moon, with high water at about 5 hours and an average rise of nearly 8 feet; neaps occurring at a similar period after the quarters of the moon, with high water at 11 hours and an average rise of 4 feet. In the second half of March and of September springs rise 9½ feet and neaps 2½ feet; in the second half of June and of December springs rise 6½ feet and neaps 5½ feet.

The diurnal tides have high water about noon on 1st January, becoming 2 hours earlier on each of the following months; springs occur 3 days after the moon's greatest declination with an average rise of 7 feet, except in the second halves of March and September, when it is 6 feet. Neaps occur at a similar period after the moon has no declination with a rise amounting to one foot in the second halves of June and December; but at other times imperceptible.

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Kwala Toako, northward of Pisang island, communicates with the Indragiri river by the Imsan Inas, and has not more than from 7 to 8 feet at low water in one part. Chart, 1,789 [2,531]. Lat. 0° 12′ S. Long. 103° 27½′ E. Var. 1° 5′ E.

AMPHITRITE BAY is 21 miles in breadth at its entrance between tanjong Bakau and tanjong Datu or Baru, and about 17 miles deep; the coast is everywhere low and marshy and consists of an extensive delta of a number of rivers.

Of the most important of these the Kwala Terbung and Kwala Toako have been already mentioned as mouths of the Indragiri; the others are the Gaung and Tumu on the western, and the Pelanduk, Igal and Mandah on the north-western, sides.

From tanjong Bakau to the entrance to Kwala Terbung a mud flat dries off the whole north coast of Baso island with a greatest breadth of 1½ miles, and between tanjong Datu and Kelajang island a similar flat extends off the north side of the bay with a greatest breadth of 2½ miles.

Southward of this latter flat is the deepest water in the bay with depths of 6 to 10 fathoms over a breadth of about 6 miles in the outer part, gradually narrowing and shoaling to 4 fathoms southward of Kelajang island; in the remaining portion of the bay the depths are under 3 fathoms.

A small bank dries for 3 cables off tanjong Muara Pisang, the west point of Kwala Terbung, and further off, and separated from it by a small channel, is a drying bank 6 miles in length in an E. by N. and W. by S. direction and a mile in breadth; the western end of this bank, which is north-eastward of the Research post on tanjong Prigi, has some small trees and brushwood on it, and on the eastern end, where it dries from 1½ to 3 feet, there are some houses on piles, and fishing enclosures.

Near the centre of the inner part of the bay is Busung island, low, thickly wooded, and one mile long in an east-north-east and west-south-west direction; except on its north-western side it is altogether surrounded by a bank of hard sand and mud which dries 7 feet and is fully 2 miles distant from the south-east side of the island, having altogether a length of 7½ miles.

A bank, which dries, also extends 2 miles from the north-east side of Chawan island, north-westward of Busung island, and the bottom over the whole of the bay consists of soft mud.

Sungi Gaung, entered 2 miles northward of Prigi on Pisang island, is about 3 cables broad at the mouth and has dark brown water owing to the presence of copper in it; about 4 miles from the entrance, on the south bank, where the river is about a cable broad, is Anak Serka village, and the entrance to the river of the same name. Lat. 0° 10½′ S. Long. 103° 28′ E.

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Chart, 1,789 [2,531]. Var. 1° 5′ E.

Simpang, a Chinese settlement, is about 30 miles up the river on the left bank, and here the river is about 60 yards in width; there are some small Malay villages on the banks, the inhabitants fishing, cutting wood, and growing sago, &c. Depths of from 1½ to 3¾ fathoms were found in this river by the Dutch war vessel *Onrust*. The water, although fresh, is not fit for drinking, being impregnated with mud and foul matter.

Anchorage may be obtained off Simpang in 4½ fathoms water, over mud, with a stern fast to the shore.

Lat. 0° 8′ S. Long. 103° 30½′ E.

Batang Tumu, entered between tanjong Rangga and the south side of Chawan island, has a depth of 1½ fathoms, at low water, in its broad mouth which quickly increases, till higher up there are depths of from 18 to 20 fathoms; on the south-west point of Chawan island is Tumu Research post.

About 6 miles up the river on the left bank there are some islands and Penghulu village, which can be reached by very small vessels.

Sungi Pelanduk and Sungi Igal.—These rivers have a common mouth which is entered north-eastward of Chawan island, the depth on the bar at low water being 2 fathoms; on the north point of Chawan island is Igal Research post. The Sungi Pelanduk is navigable for 15 miles from the mouth, and the depths are from 4 to more than 7 fathoms; about 7 miles from the entrance the river connects, by a deep branch, with the Banteian river, which has depths of from 3 to 9 fathoms for a distance of 12 miles. The least depth in the Sungi Rawang, westward of Chawan island, is 2½ fathoms.

The Sungi Igal has an almost parallel course to the Sungi Pelanduk, and after the bar is passed the depths increase to 4 and 7 fathoms. About 2½ miles from the bar is Singkajan island, and 6 miles beyond Poleh village and a Chinese settlement are situated on the right bank of a small river, and on the left bank there is a Malay village.

Anchorage may be obtained off Poleh village in 15 fathoms water.

Lat 0° 2′ S. Long. 103° 36′ E.

Mandah river, entered westward of Kelajang island, has a depth of about 2½ fathoms at low water in its mouth, and inside forms two branches named Sungi Ibu Mandah and Sungi Anak Mandah, which run almost parallel to one another.

The former river, for 9 miles of its length though sufficiently deep, is small, and about 4½ miles from its entrance there is a branch, with a depth of about 3 fathoms, communicating with Sungi Anak Mandah. One mile higher up is a small river navigable for small vessels, with a Chinese village near its mouth and a large Malay village half a mile above.

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The Sungi Anak Mandah, 7 miles above the entrance, splits into three branches; the banks of all these rivers are densely wooded. Chart. 1,789 [2,531] Var. 1° 5′ E.

Directions.—Proceeding to these rivers from the northward, having rounded tanjong Datu, in not less than 12 fathoms water, steer to the south south-westward to bring that point to bear N.N.E., distant about 5 miles and then alter course to West until tanjong Sawa Belaras, the south-east point of Kelajang island, bears North.

Bound to the Gaung or Tumu river vessels may pass between Busung island, with its large drying bank, and Chawan island, steering about S.W. by W. ¾ W., or, after rounding tanjong Datu, haul into the bay by the lead, to the southward of Busung island shoal.

Proceeding to the Mandah river, when tanjong Sawa Belaras bears North, the course is about N.W. by W., taking care not to approach Kelajang island within a distance of 6 cables.

Tides.—*See* Kwala Lajau, page 638.

Tidal streams.—Outside Amphitrite bay the flood stream sets to the southward and ebb to the northward; in the bay, to about 4 miles from the coast, the flood sets to the westward, southward of tanjong Datu and continues to the southward to south-westward between Busung and Chawan islands into Kwala Toako, but eastward of Busung island this stream sets south-west into Kwala Terbung. With tanjong Datu bearing north the flood sets in a southerly direction.

The ebb from Busung island sets across the mouths of the Pelanduk, Igal and Mandah rivers to the northward, and then continues to the eastward along the coast to the southward of tanjong Datu; in the middle of the bay the ebb sets to the north-eastward. The greatest rate of the tidal stream, observed, was 3 knots.

CAUTION.—The outer edges of the shoal, extending from the points of entrance to Amphitrite bay, are "steep-to," having depths of 10 or 11 fathoms within half a mile in some places, shoaling rapidly to 2 fathoms; they should be given a wide berth. Fishing enclosures will be found on the bank in various parts of the bay.

COAST.—All this part of the coast of Sumatra is flat, low land, thickly wooded with trees about 120 feet high.

From tanjong Datu, a low headland, the coast trends northward for 11½ miles to the south point of Kateman island, which is 13½ miles in length in a north west and south-east direction, and separated from the Sumatra coast by the Selat Pedada, the mouth of which is about 70 yards in width, and dry at low water. Lat. 0° 0′. Long. 103° 48¼′ E.

The depths in the strait are from one fathom to 4 fathoms, and the banks are covered with mangroves and nipa, with sago trees in places; the

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Chart, 1,789 [2,531]. Var. 1° 5′ E.

tream of the ebb sets strongly through this strait. This coast is fronted by a shallow bank extending from 2 to 6 miles off shore to the 5-fathoms contour line; it may be approached by the lead, as, from 10 fathoms upon its edge the depths gradually decrease to 3 fathoms.

Kateman river, entered on the north side of Kateman island, has 7 feet at low water, over the bank fronting the entrance, which is half a mile in width and has a depth of 3 fathoms, and at Gunting village, about 5 miles from the mouth, and where is the river of the same name, the depth is 5 fathoms; the water of the river is dark coloured owing to the presence of copper, and a coppered vessel lying in the river would be cleaned in a few hours. The east entrance point is steep, as are the banks which are thickly covered with mangroves; to cross the bank, fronting the river, the entrance should be steered for, bearing S.W. ¾ S.

Tides.—*See* Kwala Lajau, page 638.

Lat. 0° 26′ N. Long. 103° 31′ E.

Burung island, 4 miles northward of Kateman river, is low, wooded, and separated from the Sumatra coast by a narrow channel with 2½ fathoms least water; a bank that dries extends 2 miles from the south-east extreme of the island.

About 4 miles northward of Burung island are the Durei islands, mentioned on page 653.

LIMA and PENUBA STRAITS.—Selayar island (Penuba) is 6½ miles in length, in an east and west direction, 2½ miles in breadth, and has a hill 984 feet above high water on its western side. It lies between Singkep and Linga, dividing the passage between those islands into two channels, named Lima and Penuba straits.

Lima strait, between the north side of Selayar island and the south coast of Linga islands, is deep and furnishes a good channel; parts of the shores on both sides are "steep-to."

Lat. 0° 15½′ S. Long. 104° 21′ E.

Pandan islet, a wooded mass of ironstone, fronts the western entrance; rocks under water extend about 2 cables from the southern and eastern sides of the island, otherwise the water round it is deep.

Lima islands, lying nearly in the middle of the strait, consist of Yu, Pandjang, Buntar, and Lima; they are hilly, wooded, and Lima is inhabited. About half a mile E. by N. of Lima there is a small overgrown heap of stones showing at high water and "steep-to" round.

Rocks, covered at high water, lie W. by S. ½ S. and W. by N. ¾ N. distant half a mile and one cable respectively from Yu islet.

Near the south coast of Linga are Labuan Dadong and Chimbing islets, connected with it at low water, and on the eastern side of the strait, is Basing islet, besides some overgrown rocks and stones.

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Fully 8 cables to the southward of tanjong Bliung, near the eastern entrance to the strait, there is a reef consisting of two parts which dry at low water. *See* page 588. Chart, 1,789 [2,531]. Lat. 0° 16½′ S. Long. 104° 31¼′ E. Var. 1° 5′ E.

Baruk island and Baruk Kechil are situated inside the 5-fathoms contour line, on the north-west coast of Selayar island, and W. by N. ½ N., distant 2 cables from the latter, is a rock with one fathom water over it; Beluntar and Lukos, two wooded rocks, lie on the coast reef of the north coast.

Directions.—Steer in mid-channel to the northward of the Lima islands and the overgrown heap of stones lying half a mile E. by N. of Lima island, and bringing the heap of stones in line with tanjong Labuan Dadong, bearing N.W. by W., use it as a stern mark, steering S.E. by E., which will clear the dangers southward of tanjong Bliung.

Penuba strait, between the north coast of Singkep and Selayar island, is deep, and in the eastern part without dangers.

Raja bay, between tanjong Sembilan, a hilly point, and Pelang, an island off the north coast of Singkep, is 6 miles broad and 4 miles deep, with depths of less than 5 fathoms and several sandy ridges in it.

In the southern part of Raja bay there is a narrow, but tolerably deep channel, along by Buntar island to the entrance of Sekana bay, which is shallow, has some streams running into it, and is navigable for small vessels at high water; the shores of this bay are muddy and covered with mangroves, and Bakong village is situated near the entrance.

The least water on the sandy ridges which front the northern part of the bay is 3 feet at low water, spring tides, over a small rock about midway between the entrance points; a reef, with 3 fathoms water over it, lies with tanjong Mentigi bearing E. by N. ¼ N., distant 2¼ miles.

The western entrance into Penuba strait is between the largest sand ridge fronting Raja bay and Pahat and Kelembai islands, which lie off the west coast of Selayar island; eastward of this, three shoals with 2½, 1¼ and ¾ fathoms water over them respectively, lie near the channel.

Penuba islet lies north-westward of tanjong Membachang on the Selayar island side, where there is the tolerably large village of the same name northward of the islet. Lat. 0° 19⅓′ S. Long. 104° 28′ E.

Sembuang and Kekek islets lie on a steep reef which extends 1½ miles south-east of Selayar island, and at the eastern entrance to the strait are Tenga and Serang islets, having a broad channel into the strait between them.

Tenga is about 100 feet above high water, and has a reef which dries extending from its eastern side, prolonged by a sand bank, with less than 5 fathoms water over it, the extremity of which is about one mile

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Chart, 1,789 [2,531]. Var. 1° 5′ E.

eastward of Tenga; Serang is about as high as Tenga and is "steep-to" on its northern side, but has a drying reef extending eastward of it.

Tides.—The greatest rise at springs observed on the south coast of Linga was 11 feet, and among the groups of islands it is generally from 8 to 10 feet at springs and about 4 feet at neaps; springs usually occur from 2 to 4 days after the moon's greatest declination.

Tidal streams.—On the west coast of Singkep and Linga the flood stream runs to the southward and westward and the ebb to the northward and eastward.

Only on the part of the coast of Singkep, between tanjong Buku and tanjong Sebayur, the flood sets N.N.W. and the ebb S.S.E.

The greatest rates of the tidal streams observed were:—Near the Alang Tiga islands 1¾ knots, the flood setting south and ebb north; on the south-west coast of Singkep, 1¾ knots; in Sebayur strait, 2¼ knots; in Penuba strait and Raja bay, 1¼ knots; in Lima strait, 1½ knots, and on the south coast of Linga 1¾ knots.

Lat. 0° 13½′ S. Long. 104° 25½′ E.

COAST.—From tanjong Labuan Dadong, the west coast of Linga trends to the northward for 3 miles to tanjong Datok, south-westward of which point, distant one mile, there is an extensive shoal of hard sand, with 2½ fathoms least water over it; between this bank and the Linga shore there is a channel, half a mile wide, with a depth of more than 5 fathoms.

Tanjong Datok is a very conspicuous point, and from it the coast trends north-north-eastward for 12 miles to Dasi strait; a reef more than a mile broad in places fringes this coast, and midway, the 5-fathoms contour line is 3 miles off it. Puton island is situated on the coast reef 2½ miles north-eastward of tanjong Datok.

Dasi strait, between the islands north of Linga and those lying southward of pulo Bakong, has a rock with 3 feet water over it, situated in the channel about midway through where the fairway is narrow; this rock is marked by the strong tidal streams, which sometimes run from 4 to 5 knots an hour.

PULO BAKONG lies close to the north-west extreme of Linga, from which it is separated by Dasi strait, and has some fairly high hills. The south-west coast of the island trends in a north-westerly direction about 13½ miles, the shore being fronted to a short distance by a reef; the eastern portion is covered with mangroves. On the north side there is a deep cutting which communicates with Chempa strait.

Close to the north-west part of pulo Bakong lie a number of islets, reefs, and rocks, amongst which navigation is impossible; the western of these islets are Blando and Karoti.

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Chempa strait.—Chempa, an irregularly shaped island, about 5 miles in length, 2 miles in breadth, and covered with hills, is separated from the north-western part of Bakong and the Blando and Karoti islands by Chempa strait, 2 miles wide, having depths in it of from 13 to 22 fathoms; Chempa island is fairly "steep-to" on its east and south-east sides, but from the north point a bank stretches out on which is Laut islet. Chart, 1,789 [2,531]. Var. 1° 5′ E.

In the northern entrance of this strait lies a narrow sand bank 2½ miles in length, having from 4 feet to 1¼ fathoms water over it, with 8 to 14 fathoms in the narrow passage between it and the Blando islands; the bank generally shows plainly from the discoloured water. The channel between the bank and Chempa and Laut islands is one mile wide, with depths of from 9 to 13 fathoms.

Buaya island lies 3 miles westward of the north-west point of Chempa island, and in the channel separating them there is a group of islets and rocks. Buaya, about 2½ miles in extent, is a remarkable island, rising to a peak 753 feet above high water, and has a rock, with less than 6 feet water over it, about a mile westward of its north extreme. Lat. 0° 10½′ N. Long. 104° 13½′ E.

Si Keling island, 300 feet above high water, and about a mile in length, in an east and west direction, lies one mile southward of Buaya island, and about a mile west-north-westward of it is Blanding island, the southward of three islands lying on a reef which extends for a distance of 3½ miles, in a north-west direction. Lobam island, 275 feet above high water, is situated on the northern part of this reef, and Tuka island lies between; this group of islands is separated from Buaya island by a narrow channel in which the depths are 13 or 14 fathoms.

Leda rock, with very little water over it, and "steep-to," lies about 1¼ miles, N.W. ¾ W., from Lobam island, and another rock is situated between them. In the neighbourhood of these reefs there are strong tidal rips. Lat. 0° 11½′ N. Long. 104° 9¾′ E.

TEMIANG GROUP.—This group, with the other islands and dangers between Buaya and Merodong islands, lie far to the eastward of the usual track of vessels bound through Durian strait; but it seems advisable to describe them for the benefit of navigators who may wish to pass through any of the channels leading into or from Rhio strait. This group is composed of four large and several small islands, lying to the north-westward of Bakong and Sebangka, and separated from those islands by a narrow channel, which appears to be obstructed by rocks. Chart, 2,413 [2,530].

Temiang island, which limits the group to the north-eastward, is 7½ miles in length, 3 miles in breadth, and irregularly shaped, the north-east side being nearly straight, but at the north-west end there is a deep

General chart, 2,757 [2,554].

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

inlet, also one at the south-east end; in the latter there are two small villages. This island, which is the largest of the group, is mostly composed of high hills, and near the west end on some table land is mount Benaya, with three summits close together, the middle one 800 feet above high water; mount Piang, with two conspicuous peaks, is on the southern portion of the island.

The three other principal islands, which lie close to the south-westward of Temiang, are divided from it and from each other by narrow channels, and the group is limited in that direction by Ompok island and several islets standing on a reef 3 miles in length. Close off the north-west end of Temiang is Pintu island, 430 feet, and beyond it is Kebat island, 241 feet above high water. All the islands are fringed with reefs.

Lat. 0° 22½′ N. Long. 104° 15¾′ E.

Pompong island, situated about 2¼ miles south-westward from Kebat, is rather more than half a mile in diameter, having in the centre a hill 433 feet above high water. A sunken rock lies W. by N., distant half a mile from the north extreme of the island; and a reef with rocks above water is situated at three-quarters of a mile north-north-eastward of Pompong, and nearly the same distance, N.W., from the north-west islet of the Babi group.

Buta Belayar (Pompong reef), N. by E., distant 2½ miles from the north point of Pompong island, consists of two rocks several feet above water. A rock awash lies a quarter of a mile to the westward, and between are depths of 5 to 8 fathoms, with 12 to 15 fathoms close to the reef.

Lat. 0° 28′ N. Long. 104° 18¼′ E.

PANGELAP GROUP.—Allor island, the southernmost of the Pangelap group, is small, round and 139 feet above high water; it is situated on a reef half a mile in diameter, at 4 miles northward of Kebat, the north-west island of the Temiang group.

Pangelap island, the largest of the group, is 3¼ miles in length, in a north and south direction, half a mile in breadth, wooded, and moderately elevated, the highest hill on the southern part being 247 feet, and that on the northern 266 feet above high water; the island is fringed by a reef, which projects in places on the east coast to a distance of a quarter of a mile, but on the west coast to a less distance. A flat rock, just above water, lies one cable south-eastward of the south point.

Dedap island, about 1½ miles in length, in a north-west and south-east direction and about a third of a mile in breadth, lies to the westward of Pangelap, from which its southern and nearest part is distant three-quarters of a mile. Three small islets are situated on the reef extending half a mile south-eastward of the island, and detached rocks, awash, lie about 6 cables south-eastward of the reef.

General chart, 2,757 [2,554].

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At about half a mile off the north-west extreme of Dedap lie Sawang, two small islets, encircled by a reef, forming the southern limit of Abang strait. *See* page 649. Chart, 2,413 [2,530]. Var. 1° 10′ E.

MERODONG GROUP lies to the westward of Niamok and Mesana (page 601), and comprises six islands, separated by narrow, unavailable channels. Merodong, the northern island, is 797 feet above high water, and one of the principal landmarks for making Rhio strait (also on pages 594, 601).

Madang islands are both low and covered with mangroves; a reef, which dries, surrounds the greater part of the island extending on the north side for 3 cables; and a detached shoal, with 5 fathoms water over it, lies one mile north-west of the island.

Between Madang islands and those eastward there are some reefs with rocks, which dry.

Dujung island, the southernmost of the group, is hilly, and has a village on its south coast; the south-east point is high and rocky. Lat. 0° 21½′ N. Long. 104° 28½′ E.

Desie, Salamanang islands, and Botjong rocks lie northward of Dujung; both islands are hilly, and the rocks overgrown with vegetation.

The channel between Mesana and the Merodong group is encumbered with dangers, and should not be used.

Dua islands, situated about 2½ miles westward of Madang islands, are two low islands, each encircled by a reef extending in some places a quarter of a mile from the shore and divided by a narrow channel having a depth of 4 fathoms; the southern island is 117 feet above high water, and has a reef with 3 fathoms least water over it, extending 4 cables eastward of it.

Two reefs, each about half a mile in extent, and separated by a narrow deep-water channel, lie from 1½ to 2 miles north-westward of North Dua island. On the south end of the southern reef is an islet, and at the north end are some rocks above water; on the north-east extreme of the northern reef is Tree rock, 14 feet above high water. Lat. 0° 26′ N. Long. 104° 20½′ E.

A coral patch, with 3 fathoms water over it, and 11 and 14 fathoms close around it, lies N.W. by W. ⅝ W., distant one mile from Tree rock.

TITAMPAN GROUP, situated north-westward of the Merodong group, occupies an oval space about 6 miles in length in an east and west direction, and nearly 5 miles in breadth; it comprises several islands, islets, and rocks, separated from each other by narrow, intricate channels which are obstructed by numerous reefs and dangers. Titampan, the south-western island, and most conspicuous of the group, is rocky

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Chart, 2,413 [2,530]. Var. 1° 10′ E.

on its north and south sides and has two hills, the northern being 390 feet above high water; Binan and Katang Linga (pages 601, 602) form its eastern and northern limits, and the Nopong islands, with the adjacent islets and reefs, its north-western.

TEMIANG STRAIT, leading from the China sea to Durian and other straits adjacent, is about 14 miles in length in a west-north-west and east-south-east direction, and 1½ miles in breadth at its narrowest part; on its south side are the northern islands of the Sebang group, Temiang, Pintu, and Kebat, and to the northward are Niamok, the Merodong group, Dua islands, and Tree rock reefs.

Lat. 0° 19¾′ N Long. 104° 27½′ E.

A pinnacle rock, awash at low water, and which generally breaks, lies in the eastern entrance of this strait, about one mile N.E. by N. of Reman islands, a group of small islands off the south-east extreme of Temiang. This danger may be passed on either side, but it is preferable to pass to the northward.

MERODONG STRAIT, between Mesana and Merodong islands on the south and Titampan group on the north, is also navigable; it has a general depth of 12 fathoms over a fairway about 1½ miles wide.

Rifleman shoal has been already described (*see* page 601).

A rock awash lies N.E. by N., distant 6 cables from the north point of Merodong; and there are also two patches of reef, one lying a quarter of a mile south-eastward, and the other half a mile south-westward, of Daleh, the southern island of the Titampan group. Besides avoiding the first-mentioned danger, vessels when working should not stand to the southward of a line joining the northern extremes of Merodong and Mesana islands, observing that the 5-fathoms contour line passes not far outside the shoals between these islands.

If using the channel between the Titampan group and Dua islands, take care not to stand within three-quarters of a mile of the south-west islands of the group lying between Titampan and Little Nopong.

PANGELAP STRAIT is bordered on the east by the Titampan group and Selanga islands, and on the west by Allor, Pangelap and Udik. It is not less than 1½ miles in width in the main fairway, with depths of from 12 to 30 fathoms.

A bank about 2 miles in length, with from 6 to 10 fathoms water over it, lies on the western side of the main fairway of this strait, having on the northern end a rock awash, from which north Selanga island bears E. ⅜ S., distant nearly 2 miles; from the rock the bank trends in the direction of Allor island, with a patch of 2¼ fathoms water, over hard sand, near its south end, from which Allor island bears S.S.W. ⅞ W., distant 1½ miles.

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Off the east side of Pangelap, a hard mudbank extends nearly one mile, with 5 to 10 fathoms water over it, and a bank of sand, half a mile in extent, with about the same depth of water, extends eastward of Udik; elsewhere the soundings are irregular, being from 13 to 28 fathoms. Chart, 2,413 [2,530]. Var. 1° 15′ E.

Owing to the uneven nature of the bottom, the strong tidal streams, near spring tides, cause whirls and overfalls which are somewhat alarming to strangers, but it seems only necessary, to avoid the above described dangers, to pass safely through the strait, as none besides those could be discovered, though carefully searched for.

ABANG ISLANDS AND STRAIT.—Little Abang island, about 1¼ miles in extent, lies 2 miles north-westward from Dedap island, with the Naiur islands, four in number and surrounded by reefs, lying nearly one mile from its eastern side. The Sepintu islets are two wooded rocks, the southern situated half a mile to the southward of Little Abang, from which they are separated by a narrow, deep channel; a rock, covering at high water, lies one cable northward of the northern, and a similar one S.E. ¾ S., distant one cable from the southern islet.

The Sawang islets, three-quarters of a mile north-westward of Dedap, are two wooded islets lying north-east and south-west from each other and connected by a reef. Lat. 0° 30½′ N. Long. 104° 15′ E.

Fully a cable north-westward of these islets there is a patch with 2½ fathoms least water over it, having on its eastern side a rock which dries.

A rock, which dries at low water, and has 4 to 9 fathoms close-to, lies W. ⅞ S., distant nearly one mile from the south-west point of Little Abang.

Abang strait, between Dedap and Little Abang, is reduced to the breadth of three-quarters of a mile by Sawang islets, already mentioned, and by the Sepintu islets and rocks. The depths near the islets are 7 fathoms, with 13 fathoms in mid-channel, increasing to 20 or 28 fathoms between the north point of Pangelap and the Naiur islets. (*See* directions at page 664.)

Great Abang island, 4 miles in length, in a north and south direction, and 2½ miles in breadth, is hilly, thickly wooded, and situated north-west of Little Abang; the highest part of the island is about 300 feet above high water.

It is separated from Little Abang by a channel with depths of from 3 to 9 fathoms, which is contracted near the centre to one cable in breadth, by a low island near Great Abang, and the reefs extending from both islands; on the east side of the low island there is a village.

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Chart, 2,413 [2,530].
Lat. 0° 35′ N.
Long. 104° 9½′ E.
Var. 1° 15′ E.

Hippomenes rock.—Tortel islet is about 3 cables off the west side of Great Abang, and W. $\frac{5}{8}$ S., distant $1\frac{4}{10}$ miles from the south point of this islet, is Hippomenes rock, awash, with from 7 to 10 fathoms around it.

Lat. 0° 31′ N.
Long. 104° 7½′ E.

Cameleon rock is small, about one foot above high water, with from 7 to 11 fathoms close to its west side; it lies with the summit of Pitong bearing N. by W. $\frac{7}{8}$ W., distant $6\frac{1}{4}$ miles, and the south point of Little Abang E. $\frac{7}{8}$ N., distant about 7 miles. Patches of 3 and $2\frac{1}{2}$ fathoms are situated from a half to a quarter of a mile northward, and north-eastward, respectively of the rock.

Pitong Summit, if not brought to bear to the westward of North, will lead well clear to the westward of Cameleon rock.

Pitong island, lying $5\frac{1}{4}$ miles west-north-westward from Great Abang, has several hills, one of which, near the south point, is 505 feet above high water. The island is surrounded by numerous islets and rocks, which, off its south-east side, extend three-quarters of a mile. Off the north-east side the depths are irregular and somewhat shallow, patches of $4\frac{3}{4}$ and 5 fathoms being found at $1\frac{1}{4}$ miles from it, and inside these there is a bank about one mile in length, in a north west and south-east direction, within the 5-fathoms contour line, the least depth on it being $2\frac{1}{4}$ fathoms at one-third of a mile from the shore.

Off its west side islets and sunken patches extend nearly one mile off.

Anak Pitong, two islets on a reef nearly one mile in extent, lie about $2\frac{1}{2}$ miles westward of Pitong island, with depths of from 12 to 18 fathoms in the channel between; the western of these islets is 187 feet above high water.

Lat. 0° 38¾′ N.
Long. 104° 0¾′ E.

Gull rock, 61 feet above high water, lies nearly $1\frac{1}{2}$ miles west-north-westward of Anak Pitong. Westward and northward of it are patches of 4 to 5 fathoms; and others may exist which are not charted, as that portion has not been surveyed.

A patch of 3 fathoms is charted 2 miles N. by W. $\frac{1}{2}$ W. of Gull rock.

Dempu strait, about 7 miles in length in a north-west and south-east direction, and 3 miles in breadth, lies between the Abang islands and Galang Baru. Fringing reefs extend from 2 to 4 cables from the islands bordering the strait.

Dempu strait affords easy navigation, the fairway being perfectly free from danger; the following rocks lie so near the islands that they may be easily avoided.

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Haai reef, a patch on which the depth is 1½ fathoms, lies a quarter of a mile, S. by E. ½ E., from pulo Dempu (page 602); a rock, with 6 feet water over it E.S.E., half a mile from the south-west point of Galang; a rock above water, one-third of a mile, E.S.E., from the north point of Great Abang; Penjabung rock, S.W. ⅜ S., distant half a mile from the north point of the island of that name. Chart, 2,413 [2,530]. Lat. 0° 35¾′ N. Long. 104° 18½′ E. Var. 1° 15′ E.

This last will be avoided if the south-west point of Galang Baru be kept open of the south-west point of Penjabung, bearing S.E. by E. ⅝ E., or the summit of Tafelberg, on Galang island, open westward of Semut island, N. ⅜ E. The depths in the strait are irregular, varying from 11 to 24 fathoms. (*See* directions at page 664.)

Tidal streams.—On the eastern side of Linga the flood, or north-going stream, runs in a north-westerly direction, eastward of Kongki Besar and Kentar islands, but between these islands it runs to the westward.

In Dasi strait the flood stream also runs to the westward and sometimes attains a rate of 4 knots an hour, often causing strong tidal rips and whirlpools.

A part of the flood, setting north-north-west along the east coast of Sebangka, runs to the north-westward through Temiang strait and unites, off Kebat island, with the flood stream coming from Pangelap strait; the flood coming from Merodong strait at the same time often causes strong tidal rips and whirlpools.

The flood setting through Dempu strait to the north-westward runs, at Abang islands, in a westerly, and at Pangelap in a south-westerly direction, a portion of this stream being deflected to the southward between Pangelap and Dedap islands.

From Abang island the flood runs to the southward between the islands near Buaya, and further, along the coast of Linga, in a southerly direction, but when 10 miles from the shore the stream is imperceptible.

At the northern entrance to Chempa strait, north-westward of Karoti island, the flood stream, setting to the westward, turns to the south-south-eastward in the channel.

The ebb stream sets in an opposite direction in all the straits except where streams meet or separate; in the fairways, generally used, the streams do not attain a velocity of more than from 2 to 2½ knots, but run from 3 to 4 knots in the narrower channels.

THE STRAIT OF DURIAN, entered between Great and False Durian, is nearly 4 miles wide, and bounded on either side by a number of islands of various sizes; it has a north-westerly direction in the southern part, then turns towards the north and terminates between pulo Buru and pulo Mantaras; the Brothers islets lie in its southern approach, and may be passed on either side. Chart, 2,402 [2,524].

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Chart, 2,402 [2,524]. Var. 1° 15′ E.

The channel eastward of the Brothers has depths of from 10 to 15 fathoms, and is 4 miles wide between them and Eastern bank ; that to the westward between the Middle Brother and pulo Sanglar Kechil has from 8 to 14 fathoms, and is 3 miles wide, but narrowed to about $2\frac{1}{4}$ miles by a $4\frac{1}{2}$-fathoms patch which lies southward of the latter island.

The general depths in the channel are very irregular and vary from 17 to 25 fathoms with some deep spots of 30 to 40 fathoms. On the eastern side of the strait the depths average from 10 to 20 fathoms, while on the western side they gradually decrease to about 7 fathoms ; the bottom in the middle consists mainly of sand and stones.

Anchorage.—Good anchorage may be obtained on the western side, over a bottom of mud and sand.

Lat. 0° 33′ N. Long. 103° 46½′ E.

Three Brothers.—South Brother, 263 feet above high water, is the largest and highest of the three islands lying at the south entrance of Durian strait. It is one mile in length, in a north and south direction, and about one-third of a mile in breadth, and may be seen from a distance of 17 or 18 miles in clear weather. A white cliff on the north-east side makes this island remarkable.

A reef extends to the distance of about $1\frac{1}{2}$ cables in places around the island, and off the south side there is a small, rocky islet with a detached shoal close southward of it ; a remarkable rock above water lies off the south-west point.

Middle Brother, 158 feet above high water, lies about $1\frac{1}{4}$ miles northward of the South Brother ; its north-west point is low and sandy. The passage between the South and Middle Brother is about a mile wide, with depths of from 7 to 13 fathoms ; but nearly in mid-channel there is a small bank with 5 fathoms water over it.

North Brother, or Round island, 97 feet above high water, is a small wooded rock ; it lies N. by W. $\frac{1}{2}$ W., distant $2\frac{1}{2}$ miles from Middle Brother, and has a reef extending about three-quarters of a cable from its south point. Two reefs lie S.E. $\frac{1}{8}$ E. and S.S.E. $\frac{3}{8}$ E., distant half a mile and one mile respectively from the island, with a clear channel between ; southward of these reefs there is a channel, about a mile in width, with a depth of 14 fathoms between them and Middle Brother.

Eastern bank, three ridges of hard sand, having a north-north-west and south-south-east direction, lying to the eastward of the Brothers, have depths of less than 3 fathoms over them. The western ridge, with $2\frac{1}{2}$ fathoms water over it, lies N.W. by W. distant $4\frac{1}{3}$ miles from the North Brother ; the other ridges, lying $1\frac{1}{4}$ and 2 miles in an east-north-east direction from the western, have depths of $1\frac{1}{2}$ and $1\frac{3}{4}$ fathoms water over them respectively.

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The 5-fathoms contour line is about 2 miles south-south-eastward of the western ridge with a depth of $3\frac{3}{4}$ fathoms close inside it, and a shoal with $4\frac{1}{2}$ fathoms water over it lies a mile further south-south-eastward; from the other ridges, depths under 5 fathoms extend for some distance in a north-north-west and south-south-east direction. Chart, 2,402 [2,524]. Var. 1° 15′ E.

Durei islands.—Several low mangrove islands, named the Durei islands, lie between $2\frac{1}{2}$ and 9 miles northward of the Sumatra coast. Sandam Laut or South island, the south-easternmost of the group, is small, 90 feet above high water, and surrounded by rocks; pulo Durei, $4\frac{1}{2}$ miles in length and the largest of the group, is 3 miles north-westward of Sandam Laut. Lat. 0° 28½′ N. Long. 103° 40′ E.

Pulo Segal Besar (pulo Sandam Besar), about 6 miles westward of the South and Middle Brothers, is $1\frac{1}{2}$ miles in length and 117 feet above high water; and north-westward of it are pulo Segal Kechil, pulo Bajar, pulo Bukit Dua, and pulo Ungku Wapa, the two latter 249 and 175 feet above high water respectively.

The south-eastern channel, which lies between the Durei group and the five last-named islands, will be best seen by reference to the Admiralty chart.

FALSE DURIAN (pulo Sanglar Besar), an irregular shaped island with a peak 651 feet above high water, is thickly wooded, and about $2\frac{1}{2}$ miles in extent, and with the adjacent islands, forms the south-western limit of Durian strait. Lat. 0° 37½′ N. Long. 103° 40¾′ E.

Pulo Sanglar Kechil, nearly a mile in length in a west-north-west and east-south-east direction, is hilly, 212 feet above high water, and separated from the south-east side of False Durian island by a narrow strait in which are two islets named pulo Ulat and pulo Kojoh; a reef, which dries at low water and has a remarkable tree on it, extends $1\frac{1}{2}$ cables south-eastward of the island.

Richardson reef, on which the depth is $2\frac{3}{4}$ fathoms surrounded by 7 and 8 fathoms, is about a cable in extent, and lies N. ¾ W., distant one mile from the south-east point of pulo Sanglar Kechil.

LIGHT BUOY.—A light-buoy, painted white, and exhibiting a *white occulting* light, with a period of system of *twenty seconds*, showing light for *ten seconds* followed by an eclipse of *ten seconds*, is moored on the north-east side of Richardson reef.

Islands.—Pulo Labu, pulo Lanon, and pulo Serela are three islets lying off the north-west point of False Durian island; the first is on a reef connected to the point, and the other two are situated on one reef, pulo Serela being about 6 cables from the island.

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Chart, 2,402 [2,524]. Var. 1° 15′ E.

Westward of False Durian island are pulo Mepa, pulo Timun, pulo Benah and pulo Kas; pulo Timun is 151 feet and pulo Kas, a hilly island, 160 feet above high water.

Pulo Peropos and pulo Ngal are situated about 5½ miles to the north-westward of False Durian island; the former is 489 feet above high water.

Other islands lie close south-westward of False Durian.

Banks.—A bank, nearly a mile in length in a north-west and south-east direction and with 4½ fathoms water over it, lies north-westward of False Durian island, the north-west point of the bank being about 2 miles distant from it. Several patches of from 2 to 3 fathoms lie within the 5-fathoms contour line on the bank southward of False Durian, for which *see* the Admiralty chart.

Clearing marks.—South Passage island, well open eastward of pulo Sanglar Kechil bearing N.W. by N., or Jora peak of Great Durian westward of N. by W., leads eastward of the patches southward of False Durian island; and it is advisable for vessels, other than of light draught, not to stand to the westward of that line, for from the irregularity of the bottom other shoals may exist.

GREAT DURIAN or MORO BESAR, on the north side of the strait of Durian, is 3½ miles in length in an east and west direction, and 3 miles in breadth; it is mountainous, and Jora peak, near its centre, is 1,015 feet above high water. A bank of mud and sand, with from 2½ to 5 fathoms water over it, extends about 2 miles from its eastern side.

Lat. 0° 42½′ N. Long. 103° 43¼′ E.

The south and south-west sides are fairly "steep-to."

Pulo Tiga (Tombs) are three rocky islets surrounded by reefs, lying about half a mile south-westward of the south point of Great Durian. There is deep water between them and the island.

Carnbee reef, composed of coral and "steep-to," dries at low water, and lies one mile south-westward of the south-east point of Great Durian island, with that point midway between the two easterly Tiga islets, bearing N.E. ¼ E. Jora peak, bearing North, leads westward of these dangers, and False Durian peak, bearing S.W. ½ W., leads south-eastward of them.

Little Durian or Moro Kechil, 562 feet above high water near its north-east side, and 2 miles in length in a north-west and south-east direction, is separated from Great Durian by a narrow channel in which there are three islets.

The south-west and north sides are precipitous, and a reef about 50 yards in extent, awash at low water, lies about two-thirds of a mile, N.W. by W., from the south point, and a quarter of a mile off shore.

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From the south-east side a bank, on which the depths are from one fathom to 5 fathoms, extends more than half a mile from the shore. Chart, 2,402 [2,524]. Var. 1° 15′ E.

South Passage island, situated two-thirds of a mile south-westward of Little Durian, is bare, 218 feet above high water, about half a mile in extent, and surrounded by rocks lying close to the coast. Lat. 0° 43½′ N. Long. 103° 30½′ E

North Passage island, 151 feet above high water, is 2 cables in extent, and lies 2¼ miles, N.W. by N., from South Passage island; a reef extends about 1½ cables from its north side.

Pulo Pelangkat (Princes island) lies about 2½ miles west-south-westward of North Passage island, on the western side of Durian strait; it is low, of coral formation, covered with trees about 100 feet above high water, and has a round and conspicuous appearance. Depths of less than 5 fathoms extend about 3 cables north and 2 cables south-eastward of the island.

Sanglar strait, lying to the northward of Great and Little Durian, and southward of the islands of Jan, Sugi Bawa, and the Monkey group, may be considered one of the southern entrances to Durian strait; it is but partially surveyed, and does not offer any advantages to induce a vessel to proceed through it, but on the contrary is inferior to, and less direct than, the other channel.

The strait is about one mile wide, with pulo Manda and a small island westward of it lying between pulo Jan and the north coast of Great Durian island, which reduce the width of the navigable channel to little more than a quarter of a mile. A rock awash lies about 2 cables westward of the small island westward of pulo Manda, and a reef about the same distance off the south-west side of pulo Jan; this is the narrowest part of the strait, with a depth of about 8 fathoms.

The soundings that have been taken in this strait and its approach are few, and as it is quite possible that shoaler parts than those known of may exist, it is not therefore recommended.

The charted depths between Eastern bank and the bank extending 1¾ miles eastward of Great Durian vary from 6 to 14 fathoms. Vessels should not go nearer to the east coast of Great Durian than 2 miles, on account of the bank already mentioned, with 3 to 5 fathoms water over it, and possibly less in places.

In the eastern part of Sanglar strait the depths are from 14 to 18 fathoms, decreasing to 8 fathoms between westward of pulo Jan, after which the deepest water is on the southern side, avoiding the banks extending southward of Monkey islands. *See* page 656.

SUGI BAWA ISLAND lies northward of Great Durian; it is 5½ miles in length, in a north-west and south-east direction, and about

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Chart, 2,402 [2,524]. Var. 1° 15′ E.

$1\frac{3}{4}$ miles in breadth at the south, narrowing to half a mile near the north, point.

Lat. 0° 48′ N. Long. 103° 41½′ E.

There is a range of hills on the northern portion of the island, which, at $2\frac{1}{2}$ miles from the north point, attain an elevation of 477 feet above high water. The west coast is low, and consists in a great part of morass, in which stand mangrove bushes. Several reefs, drying at low water, render this coast foul; a low islet lies south-westward of the north extreme of the island.

Monkey islands, three in number, lie from one mile to $2\frac{1}{2}$ miles westward of the south part of Sugi Bawa; pulo Moro Tenga, the middle island and largest, is about three-quarters of a mile in diameter. The others are named pulo Moro Laut and pulo Moro Darat.

Reefs.—Two patches of reef awash lie $2\frac{1}{4}$ cables west-north-west of the westernmost Monkey island, and a sandbank, with $1\frac{1}{4}$ fathoms water over it, extends about half a mile from the north side of the same island, and to the northward of this there are two patches with $3\frac{1}{2}$ and 5 fathoms over them respectively; also a small patch, on which the depth is 4 fathoms, lies about a quarter of a mile off the south-west side of the island.

Pulo Moro Tenga and pulo Moro Darat have each a spit, with $3\frac{3}{4}$ fathoms water over it, extending for about half a mile from their south extremes. To the southward of the former island is a bank, a mile in length, with depths of from 4 to 5 fathoms over it. The west extreme of Little Durian, bearing S.S.E., or North Passage island S.W. by S., leads westward of the reefs extending from pulo Moro Laut. In the channel between these reefs and North Passage island, the depths are from 27 to 28 fathoms close to the island and in the fairway, but near the Monkey island reefs they are about 15 fathoms; about 2 cables north-eastward of North Passage island there is a depth of 9 fathoms.

Clearing mark.—False Durian peak open of the north-west point of Little Durian, bearing S. by E. ½ E., clears the dangers lying westward of Monkey islands and Sugi Bawa island.

Lat. 0° 50½′ N. Long. 103° 39¼′ E.

Belukar island, situated off the north-west end of Sugi Bawa island, is low, thickly overgrown and about three-quarters of a mile in length in a north-north-west and south-south-east direction; it is fronted on its western side by a coral reef extending in places to the distance of 2 cables, with irregular depths of 8 to 14 fathoms close-to.

Dangers.—A reef, 2 cables in extent, "steep-to," which dries at low water, spring tides, lies with the south point of Belukar island, distant $1\frac{2}{10}$ miles and in line with the sandy north point of Sugi Bawa island, bearing E. $\frac{5}{8}$ N. and with pulo Mantaras bearing N. by W. $\frac{7}{8}$ W.

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A sunken rock, with about 6 feet water over it, lies 6 cables, N.W. ½ W., from the north extreme of Belukar. Chart, 2,402 [2,524]. Var. 1° 15′ E.

Pulo Panjang, the southern end of which lies about one mile eastward of the north end of Sugi Bawa island, is a narrow hilly island about 3½ miles in length, in a north-west and south-east direction, and half a mile in breadth. The hills at the northern end rise to a height of 342 feet, and at the southern end to 447 feet above high water. To the eastward of the north point a bank extends for a distance of a mile to the northward, having over it a least depth of 2½ fathoms.

Reef.—A reef, about 1¾ miles in length and with a depth of 3 feet near its northern extreme, lies parallel to pulo Panjang, and nearly midway between it and Belukar island.

Itik islets (The Twins) are two small round, overgrown islets, 165 feet above high water, lying a little more than one mile north-eastward of pulo Mantaras and one mile north-west of pulo Panjang. Lat. 0° 53′ N. Long. 103° 38½′ E.

A patch, with 3¾ fathoms water over it, lies S.S.W. ½ W., distant about half a mile from the southern Itik islet.

Itik reefs.—At three-quarters of a mile north-westward of the northern Itik islet is the outer of three dangerous coral reefs 4 cables in extent, dry at low water, spring tides, and having from 10 to 17 fathoms around. The west side of North Passage island touching the east side of pulo Mantaras, bearing S. ⅛ E., leads westward of them.

Pulo Mantaras (Red island), lying nearly 2 miles north-west of Belukar island, is about 4 cables in diameter, covered with trees, and 245 feet above high water; it should be visible from a distance of 15 miles in clear weather, and is conspicuous on account of its reddish coloured rocks rising almost perpendicularly from the sea.

Nearly half a mile northward of pulo Mantaras is pulo Mantaras Kechil, a rocky islet with two trees on it, surrounded by rocks dry at low water; between it and pulo Mantaras the depths are about 12 fathoms.

Dangers.—In the passage between pulo Mantaras and Belukar island lies a reef, which dries at low water, spring tides, and is "steep-to." From its centre, the north-east end of pulo Mantaras is in line with the south peak of Great Karimon, and the centre of the Itik islets bears N. by E. ⅜ E.

Melville reef, a rocky patch, about a cable in extent and dry at low water, lies rather more than half a mile, W.S.W., from the west end of pulo Mantaras, with 7 to 9 fathoms all round, and 16 to 19 fathoms between it and the island. From the centre of the patch, the north-west bluff of pulo Mantaras, bearing N.E. by E., is in line with the south

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Chart, 2,402 [2,524]. Var. 1° 15′ E.

end of the northern Itik islet; and the peak of False Durian is just within the east extreme of South Passage island, S. by E. ½ E.

Lat. 0° 51½′ N. Long. 103° 34½′ E.

Middleburg reef lies nearly midway between pulo Mantaras and the bank with less than 3 fathoms water over it, fronting pulo Belat and pulo Buru ; it is a reef of coral rocks, nearly a cable in extent, dry about one foot, at low water, spring tides, with from 7 to 9 fathoms close to the rocks, and from 17 to 20 fathoms about one cable off. From the centre of the shoal, the Passage islands are in line bearing S.S.E. ¾ E. ; and pulo Mantaras Kechil is nearly touching the northern Itik islet, N.E. by E. ⅔ E.

LIGHT BUOY.—A buoy, painted black, and exhibiting a *white occulting* light, with a period of system of *twenty seconds* showing light for *ten seconds* followed by an eclipse of *ten seconds* duration, is moored on the south-western side of Middleburg reef.

Clearing mark.—The whole of South Passage island open eastward, bearing S.S.E. ⅛ E. or westward S.E. ⅝ S. of North Passage island, clears Middleburg reef. The peak of False Durian in line with the apex of North Passage island bearing S. 22° E. leads in mid-channel, between it and Melville reef.

Chart, 1,355 [2,513].

KUNDUR ISLANDS.—These islands, the principal of which are Kundur, Belat, Papan, Ungar, Buru, Parit, and Tulang, are situated on the western side of Durian strait, and separated from each other by narrow channels with varying depths.

Some of these islands are hilly, the others low. The highest peaks are Papan, 689 feet, on the island of that name, and Salah, 415 feet, Tas, 404 feet, and Gading 462 feet above high water, on Kundur island.

Most of these islands are inhabited, and a representative of the native self-government resides on the south-west coast of Buru.

Pulo Kundur, the largest of these islands, is about 16 miles in length, in a north and south direction, and 10 miles in breadth ; its coasts are low and marshy, and on the south-east and south coasts, respectively, are Batu and Gading villages. The inhabitants are principally Chinese, who cultivate gambier and pepper.

Islets and reefs.—The western side of Kundur is fronted by a shallow bank, extending in places to about 1½ miles from the shore; on it are many rocks above and below water.

On the south-east side is an extensive shallow bank, on which are also several rocks and islets.

Lat. 0° 49½′ N. Long. 103° 17′ E.

Lalang islet, lying about 4 miles to the westward of Kundur, is covered with vegetation, and has a remarkable tree on it; around this islet are a number of reefs and rocks.

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Rusah islet, situated 6 miles to the southward of Lalang, has from the southward the appearance of a junk under sail. To the south-eastward of it, almost midway between Mendol and Kundur islands, lie four reefs at distances of 1, 2¾, 5, and 6½ miles respectively; the first two, the Turus and Lanjang reefs, and the last, are visible at high water; the third is nearly awash at low water. Chart, 1,355 [2,513]. Lat. 0° 43′ N. Long. 103° 16½′ E. Var. 1° 15′ E.

About a mile from tanjong Lubuh, the south-west extreme of Kundur, is a small rock above water, known as Batu Jangi. This rock lies at the southern end of a bank, stretching to the north-westward parallel to the coast of Kundur for nearly 8 miles; near its northern end is a long reef, with a depth of a quarter of a fathom over its shoalest part.

Pulo Ungar, separated from pulo Kundur by a channel about half a mile in width, is 5½ miles in length in a north-north-east and south-south-west direction and 1¾ miles in width; a bank, with less than 3 fathoms water over it, extends about 3 miles eastward of the island, on the edge of which, and bordering the west side of the strait, there are a number of islands, of which pulo Peropos and pulo Ngal, 4 miles eastward of the north-east point of pulo Ungar, are the largest and most distant. Chart, 2,402 [2,524].

Pulo Degong, 4 miles northward of pulo Ungar and 1¼ eastward of the east point of pulo Kundur, is about 2½ miles in length in a north and south direction, and 1½ miles in breadth; Deepwater point, the eastern point of pulo Degong, is nearly 3 miles north-west from pulo Pelangkat, and has a depth of 5 fathoms within a short distance of it, and from 8 to 9 fathoms beyond. Lat. 0° 46¾′ N. Long. 103° 33¼′ E.

From pulo Degong the coast of pulo Belat trends north-westward, and in a bight lying between it and pulo Buru are several islands; this bight is fronted by a bank, with less than 3 fathoms water over it, extending out to a line from Deepwater point to a position half a mile eastward of pulo Buru.

PULO BURU is a low island about 4 miles in length in a north-north-west and south-south-east direction, crowned with high trees and having a few inhabitants, who grow quantities of mangosteins, durians, and other fruits, which flourish here.

The eastern shore of pulo Buru is fronted by a shallow bank to distances of from a half a mile to one mile, with rocks awash at half tide lying on it. This bank, and its continuation to the southward, will be avoided by keeping Deepwater point bearing southward of S. ½ E.

Pulo Pandan Besar, the southern of two small islands lying about one mile northward of pulo Buru, is low and covered with trees about 100 feet in height; pulo Pandan Kechil lies close north-eastward of it. Chart, 2,403 [2,525]. Lat. 0° 57′ N. Long. 103° 29½′ E.

General chart, 1,355 [2,513].

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Chart, 2,403 [2,525]. Lat. 0° 57′ N. Long. 103° 27½′ E. Var. 1° 15′ E.

Pulo Parit is nearly as large as pulo Buru, and lies to the north-westward of it. But little is known of these islands and others in their neighbourhood.

Dangers.—Patches with 3 and 4¾ fathoms water over them are situated nearly 2½ miles, S.E. by E., and a small patch on which the depth is 5 fathoms lies East, distant 1½ miles from pulo Pandan Besar; and three patches of 4¾ fathoms lie E. ¼ N. 2½ miles, E. by N. ½ N. 2¼ miles, and N.E. ½ N. the same distance from it. A shoal with less than 3 fathoms water over it extends about three-quarters of a mile north-west of pulo Pandang Kechil on the south side of Gelam strait.

The peaks of Little Karimon in line, bearing about N.W., lead eastward of these banks. (*See* Karimon islands and dangers, page 135.)

Philip channel, *see* page 217, and directions for, at page 666.

THE BULAN ARCHIPELAGO, of which Kapala Jeri is the westernmost large islet, forms the east side of the northern approach to the strait of Durian, and more particularly to Chombol strait. Pulo Jangkan is situated about 4 miles westward of the south end of Kapala Jeri, with numerous islets and reefs between and in the direction of Steep cape, and also between pulo Jangkan and Chombol island. Some of these islands are inhabited. (*See* also page 218.)

CAUTION.—In the present state of our knowledge no vessel should venture among these islands, and, therefore, only the outermost islands and dangers which concern the ordinary navigator will be described.

Chart, 2,402 [2,524].

THE STRAIT OF SUGI lies between the islands Great Durian, Sugi Bawa, and pulo Panjang on the west, and pulo Sugi on the east. All these islands are but thinly populated.

The western part of the strait is rendered foul by a number of reefs and small islets.

The eastern part is however safe for navigation, as, with the exception of a rock above water lying off tanjong Riu, the reef, in the bay to the northward of it, and two patches of 4¼ and 5 fathoms lying near the north-western part of the island, the west coast of Sugi is clear of danger, and can be approached to a tolerably short distance.

Pulo Sugi is 10 miles in length in a north-west and south-east direction; it has general breadths of between 2 and 3½ miles.

Lat. 0° 49¾′ N. Long. 103° 47¼′ E.

A range of hills runs through the island, the highest point being a saddle-shaped peak named Berkaka, 1,005 feet above high water. There are also hills on either side of this ridge.

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On the west coast is tanjong Malang Tiang, a precipitous hill, 558 feet above high water. Chart, 2,402 [2,524]. Lat. 0° 47¾′ N. Long. 103° 46½′ E. Var. 1° 15′ E.

Pulo Telumas is a remarkable island, consisting at the northern end of a steep hill 206 feet above high water, whilst the south end is low.

A reef extends from the south-east point and is prolonged by a sandbank for about a mile; beyond this, at a distance of a quarter of a mile, is a patch with 5 fathoms water over it. About 3 cables off the north-west point of the island is a reef that dries.

About a mile westward of pulo Telumas are Chonding Besar and Chonding Kechil, two small islets, the former 111 feet above high water; they are each surrounded by a drying reef and have a bank, with 4¼ fathoms water over it, extending half a mile south-south-eastward.

Directions.—The strait of Sugi presents easy navigation for steam vessels; pulo Telumas can be passed on either side, then keep along the shore of pulo Sugi and leave the strait by the channel between pulo Jaga and pulo Manis or between pulo Manis and pulo Janka, in either of these fairways keeping in mid-channel in order to avoid the reefs extending from the islands.

Submarine telegraph cable.—The telegraph cable between Singapore and Batavia passes through this strait.

The strait of Sulit, between pulo Sugi and Chombol island, is of no importance for navigation, as its southern entrance is almost closed by banks.

THE STRAIT OF CHOMBOL lies between the islands Chombol and Chitlim and the Seranjau islands to the south-west, and pulo Bulang to the north-east.

Chombol island, of the same formation as pulo Sugi, is 7½ miles in length in a north-west and south-east direction, its greatest breadth being a little over 3 miles. A range of hills, the highest point of which is 795 feet above high water, runs down the centre of the island, and it is also hilly near the coast, but the land between is flat. It is but thinly populated. Linggakan, a small Malay village, is situated on the north coast, whilst inland, here and there, a Chinese settlement will be met with, the inhabitants of which cultivate gambier. Lat. 0° 51¼′ N. Long. 103° 50¼′ E.

Chitlim island, south-eastward of Chombol island, and separated from it by Selat Mie, a narrow channel, the shores of which are marshy on each side, is also hilly, reaching a height of 533 feet above high water.

The Seranjau group consists of several islands; pulo Seranjau, the largest, is 353 feet above high water.

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Charts, 2,402 [2,524]; 2,403 [2,525]. Var. 1° 15′ E.

Pulo Bulan is generally low, except the south-eastern part, which is hilly. Bulan peak, a conspicuous hill, is 735 feet above high water.

The Luing group, south-eastward of pulo Bulan, consists of a number of very low islets, on the northern of which there are some conspicuous trees.

Lat. 0° 52½′ N. Long. 103° 54¼′ E.

Within the strait are several islets, of which Pisang, 238 feet above high water, when seen from a distance has the appearance of a half sphere, is the most remarkable.

Banks and reefs.—At the southern entrance to the strait there lies, to the eastward of the Seranjau islands, a bank with 2 fathoms least water over it, and to the northward of these islands a shoal with a depth of 1½ fathoms.

The northern part of the strait is much encumbered by reefs and islands.

CAUTION.—Owing to the strength of the currents and the number of reefs in this strait, it is not recommended to be used, except in case of necessity, when the following remarks may be found useful:—

Directions.—From the south-eastward, after passing pulo Pisang, follow the shore of Chombol island and steer in mid-channel between it and pulo Semangka, a flat island. From thence steer between pulo Badas and pulo Terang, keeping at first well over to the Chombol shore in order to avoid the bank extending to the south-eastward from the first-named island.

Chart, 2,403 [2,525].

When the north point of pulo Badas bears East, alter course to pass to the northward of Sepatu island, giving it a sufficient berth to avoid the reef

Lat. 0° 58′ N. Long. 103° 42¼′ E.

extending from it, and then, when Jangkan island (104 feet above high water) bears N.W. ½ N., course can be altered to pass to the westward of it. A bank with less than 3 fathoms extends about 2 miles from the north end of pulo Sugi.

Badas is high and Terang low; the north point of the former must not be approached too closely, as there is a reef off it; Sepatu is low and has a reef extending half a mile west-north-westward of it. There are two high trees on Telok Bakau island, northward of Sepatu.

Chart, 2,402 [2,524].

Tides.—It is high water, full and change, in Durian strait and the straits between it and pulo Bulang at 11 hr. (approximate); springs rise about 10 feet; neaps 6 to 7 feet.

Tidal streams.—The tidal streams have a velocity sometimes of from 3 to 4 knots per hour during springs; at other times not more than 2½ knots at the same period. This irregularity appears to be produced by the prevailing winds in the north or south entrance of the straits,

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forcing the streams through in one direction for 12 or 18 hours at a time, although the rise and fall on the shore was regular. But sometimes the streams run with regularity. Chart, 2,402 [2,524]. Var. 1° 15′ E.

In Durian and Chombol straits the flood usually sets to the southward and the ebb to the northward, but this cannot be relied upon, for frequently the current runs for 24 hours in the same direction.

Ripplings.—The ripplings met with in the straits might be alarming to a stranger; they appear to be caused by the uneven bottom and the resistance the streams meet with from the steep reefs and numerous small islands.

BULAN STRAIT OR SALAT BATU HAJI lies between Batam and the islands to the westward of it, the largest of which is Bulan. Lat. 1° 9′ N. Long. 103° 54½′ E

It is narrow, but can be navigated with local knowledge by steam vessels of moderate size, for whom it affords the shortest route from Singapore to the southward, and also another route into the Rhio strait, which might be useful in the N.E. monsoon. (*See also* page 218.)

Tides.—It is high water, full and change, about noon; springs rise from 7 to 8 feet.

Tidal streams. — In Bulan strait, from pulo Sambu up to tanjong Gunip, the flood stream sets to the southward, in the south entrance it sets to the northward, and in the east approach from Rhio strait it sets to the westward; these currents meeting off tanjong Gunip generally cause heavy tidal rips.

At springs the rate of the stream is from 3 to 3½ knots per hour.

DIRECTIONS.—Banka strait through the straits of Berhala and Durian to Singapore.—Steam vessels use Rhio strait, and as stated on page 630, Berhala strait, during the strength of the north-east monsoon, is frequently used by sailing vessels, but it must be borne in mind that it is but imperfectly surveyed. Charts, 2,757 [2,554], 1,789 [2,531].

To proceed by this route, from the north entrance of Banka strait, and having passed Frederik Hendrik rocks, a course should be shaped for Berhala island, distant about 74 miles, avoiding the bank extending south-eastward of tanjong Jabong. The bank along the Sumatra coast being shelving, the lead will be the best guide, and the rule is to keep in from 5½ to 7 fathoms water. In working, the coast may be approached with care to a low water depth of 5 fathoms, observing that the bank with less than 5 fathoms water over it extends nearly 13 miles south-eastward of tanjong Jabong.

The tidal streams near the shore are generally strong; in the offing they are irregular, and currents sometimes prevail.

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Charts, 2,757 [2,554], 1,789 [2,531]. Lat. 0° 51½′ S. Long. 104° 24½′ E. Var. 1° 5′ E.

Pass southward of Berhala island, keeping in from 10 to 12 fathoms water towards it, to give a berth to the bank projecting from tanjong Jabong; thence in working along the coast to the westward, the bank is "steep-to," and may only be approached occasionally, with care, to 8 or 7 fathoms.

Being westward of the narrow part of the strait between tanjong Jabong and Berhala, which is about 7 miles wide, a course should be steered towards the Alang Tiga islands, in depths of from 9 to 12 fathoms. With a working wind, the Sumatra coast may be approached to depths of 6 or 7 fathoms. When steering towards the Alang Tiga islands, Muju, the southernmost island, must not be brought to bear westward of N.W. by N. until Serak island bears southward of E. by S. ½ S., to avoid Speke rock.

In this track attention to the tidal streams is indispensable, for they are often irregular, sometimes setting out of the mouths of the Jambie river to the north-eastward at the rate of 2½ or 3 knots an hour; and the coast bank to the distance of 14 or 15 miles westward of tanjong Jabong is nearly dry at low water, spring tides, in some places 4 or 5 miles from the shore.

Between Alang Tiga islands and Baso island the depths vary from 7 to 8 fathoms near Alang Tiga to 13 and 14 fathoms near Baso; deepening to 15 and 18 fathoms 2 miles eastward of tanjong Datu.

Having passed Alang Tiga islands at a distance of about 2 miles, a course should be steered for the southernmost of the Three Brothers; when Jora peak of Great Durian is seen over the South Brother, bearing N. by W. ¾ W., it should be steered for, passing on either side of South Brother.

In working, be careful not to stand nearer to Baso island, or tanjong Datu, than 2 miles, and off Amphitrite bay, remember that the bank, which extends beyond a line joining tanjong Bakau and tanjong Datu, is "steep-to," and the lead will give no warning. At 6 or 7 miles northward of tanjong Datu the depths decrease more regularly towards the bank, which may from thence be approached by the lead into depths of 8 or 7 fathoms towards the low Durei islands. In standing to the eastward, do not deepen above 18 or 19 fathoms, particularly as the distance from the Alang Tiga islands is increased, for the ground on that side is foul and unsuitable for anchorage.

Clearing marks for Cameleon rock, on the eastern side of the channel, have been given in page 650, and the navigator is referred to them if standing so far over to the eastward, which is, however, out of the fairway track.

Berhala to Singapore by Abang and Dempu straits.—It should be mentioned here that, in order to avoid the difficulty and

General chart, 2,757 [2,554].

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delay sometimes experienced in getting from the northern part of Durian strait to Singapore road, many sailing vessels have preferred to pass from the Inner route by Abang strait, and Dempu strait, into Rhio strait. It seems probable that the best passages might be made in this way, for the great depth of water in the western part of Singapore strait is often embarrassing in light winds.

Charts, 2,757 [2,554], 1,789 [2,531]. Var. 1° 5′ E.

H.M.S. *Saracen* made a good passage by the Abang strait route, first experiencing all the advantages of the smooth water and less unfavourable tidal streams of the passage inside Linga by Berhala strait, and then passing without the least difficulty through Abang strait into Rhio strait. (*See* page 649.)

Strait of Durian.—Coming from the southward Jora peak on Great Durian island, which is visible from some distance, should be steered for bearing N. by W. ½ W., and, when the South Brother is sighted, course may be shaped to pass either eastward or westward.

Chart, 2,402 [2,524]. Lat. 0° 42½′ N. Long. 103° 43¼′ E.

A sailing vessel having passed eastward of the Brothers, and standing towards Eastern bank, should not bring Jora peak to bear westward of N.W. by W.; or if the vessel gets on the edge of the overfalls in making the eastern board, it will be necessary to tack immediately, and stand towards the Brothers to 10 or 11 fathoms water.

When the southern point of Great Durian island is approached, pulo Tiga will be discerned; and also pulo Papan hill, in clear weather, making like two islands, which may be mistaken for the Karimons. Having passed the North Brother at about 1½ miles distance, steer to pass about one mile northward of the north end of False Durian island.

If working, by keeping North Passage island open westward of Little Durian, bearing N.W. ¼ N., Carnbee reef, south-westward of pulo Tiga, on the north side of the passage, will be avoided.

Westward of the Brothers.—After passing about 1½ miles westward of the Brothers in from 10 to 14 fathoms water, the strait should not be entered until North Passage island is open eastward of South Passage island, bearing N.W. ⅝ N., or False Durian island peak, W. ¼ S., to avoid Richardson reef.

If standing towards Great Durian, keep North Passage island open westward of Little Durian as before stated.

North-westward of the Brothers.—Having arrived north-westward of the Brothers by either of the tracks just mentioned, the Passage islands will be seen to the north-westward and should be steered for, passing between them and pulo Pelangkat. In mid-channel the depths will be generally from 17 to 26 fathoms. On approaching Passage

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Charts, 2,402 [2,524]; 2,403 [2,525]. Var. 1° 10′ E.

Lat. 0° 37½′N. Long. 103° 40¾′ E.

islands, pulo Mantaras, about 6½ miles northward of North Passage island, will be discerned, with the Itik islets north-eastward of it.

The peak of False Durian island in line with the apex of North Passage island bearing S. 22° E., leads midway between Middleburg and Melville reefs, in depths of from 17 to 21 fathoms; should the channel, passing about one mile westward of Middleburg reef be taken, the water shoals gradually towards the western shore over a bottom of soft mud, suitable for anchorage.

Deepwater point bearing about South, clears the dangers extending off pulo Buru and the islands northward, in depths of from 9 to 12 fathoms. The peaks of Little Karimon, bearing westward of N.W., also clear the dangers which project 3 miles from the shore of Great Karimon island. If bound through Malacca strait, round Little Karimon at a prudent distance.

Sailing vessels, working to the northward of North Passage island, when standing towards Sugi Bawa island, should not go to the eastward of False Durian peak in line with the north-west end of Little Durian, bearing S. by E. ¼ E.

In working, keep South Passage island open westward of North Passage island, bearing S.E. ⅝ S. when to the westward of Middleburg reef; the western shore may be approached to a depth of 5 fathoms.

In working eastward of, and standing towards, Middleburg reef, do not bring the peak of False Durian open westward of North Passage island more than the breadth of that island, bearing S.S.E. ⅛ E.; and when standing towards Melvill reef, tack before False Durian peak touches South Passage island, S. by E. ¾ E. The tidal streams usually run from 3 to 4 knots an hour between Middleburg reef and pulo Mantaras, the flood setting to the southward and the ebb to the northward.

Leaving the strait at night and being northward of North Passage island, it is preferable to keep on the western side, in about 10 fathoms water, which leads clear to the westward of Middleburg reef, the light-buoy moored south-westward of the reef should also be a guide, the light being visible, in clear weather, from a distance of 6 miles.

Vessels from Dempu strait are recommended to pass southward of Pitong islands and to bring the peak of False Durian island (which from this direction appears in the form of a saddle) to bear W. ½ N. to clear the eastern bank.

Chart, 2,403 [2,525].

To pass through Phillip channel.—If bound to Singapore and being northward of Middleburg reef, with pulo Mantaras bearing East, a course may be steered, allowing for the tidal stream, to pass through Phillip channel in the fairway between Cap and Round islands. Neither

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of these islands should be approached nearer than three-quarters of a mile, on account of the reefs which project from them. Chart, 2,403 [2,525]. Var. 1° 10′ E.

In this route, care is necessary against being set too near the dangers which lie in the approach to Chombol strait, for the tidal stream runs through it with a velocity of 3 or 4 knots an hour at spring tides.

Having passed Cap island, bring it to bear S.S.W. astern, which bearing being maintained, will lead through in mid-channel between Round island and Helen Mar reef. The depths in this track vary from 15 to 30 fathoms. Lat. 1° 3′ N. Long. 103° 43′ E.

In working, if standing westward of the south end of the Round island, do not go further in that direction than to bring Raffles lighthouse on with the north-west end of Long island, bearing N.E. $\frac{7}{8}$ N., to avoid the reefs lying south-west of Red island.

Standing towards the north-east sides of Round and Long islands, Cap island should not be brought southward of S. by W. $\frac{1}{4}$ W., or Raffles lighthouse eastward of N. $\frac{3}{4}$ E. Cap island kept southward of S.S.W. $\frac{3}{4}$ W. leads westward of Helen Mar reef, and when Gunong Jantan on Great Karimon is well open northward of Red island, bearing W. $\frac{7}{8}$ S., a vessel will be northward of that danger, and may proceed into the fairway of the main channel of Singapore strait. To proceed from thence to Singapore road, *see* pages 227, 247.

If preferred, instead of using Phillip channel, a vessel, after passing Middleburg reef, may steer a course to pass into Singapore strait westward of Tree island.

From Singapore strait through the straits of Durian and Berhala the preceding directions must be reversed ; Rhio strait, having been carefully surveyed, is to be preferred, and is also well lighted and buoyed.

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APPENDIX.

PORT REGULATIONS RELATING TO FOREIGN VESSELS OF WAR ENTERING, OR ANCHORING IN, ANY HARBOURS OR ROADSTEADS OF NETHERLANDS EAST INDIA.

(1) The term "Foreign vessels of war" includes any foreign vessel of war, or any vessel having Military troops on board: the vessels belonging to Powers friendly to the Netherlands.

(2) Notice of the entry into, and anchorage in, any harbour or roadstead of the Netherlands India, by a foreign vessel of war, shall immediately be sent—and if possible by telegraph—to the Naval Commander in-Chief, by the principal Civil authority of the place.

(3) The Harbour Master, or his Deputy, shall furnish the Officer Commanding any foreign vessel of war entering into, or anchoring in, any harbour or roadstead of Netherlands India, with the following:—

(*a*) A copy of an English, a French or a German extract from these regulations.

(*b*) A form, issued by the Naval Commander-in-Chief, in the English, the French and the German languages, containing queries respecting nationality, name, details of crew and armament, &c., &c., of the vessel, and a copy of this form, duly filled in, shall be transmitted, without delay, to the Naval Commander-in-Chief and to the Chief of the Governmental administration.

(4) The crew of any foreign vessel of war, within the boundaries of the Dutch Indies, shall not be allowed to make any hydrographical or land surveys, nor to engage in disembarking drill, nor, except as provided in Article 5, to engage in target practice.

(*a*) The crew shall only be allowed to land unarmed, exception being made in the cases of the officers and non-commissioned officers, who are permitted to carry the sword, or dirk, pertaining to their uniform. The boats, belonging to the vessels, when used, as well as their crews shall be unarmed.

(*b*) If for particular reasons, for instance in the case of a funeral on shore, exemption be desired from the prohibition contained in the preceding clause (*a*), the permission can be obtained, in the chief towns of Governments, from the head of the Governmental administration, and, in other places, from the principal Civil authority of the place.

(5) The Officer Commanding a foreign vessel of war, visiting the port of Batavia can be granted a permission for rifle practice on shore.

(*a*) Application, for the above-mentioned permission, shall be made, by the said Officer Commanding, to the Naval Commander-in-Chief.

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(*b*) In case there be no objection to grant the request, the Naval Commander-in-Chief will send a declaration to the Officer Commanding, acquainting the latter with the place and time where the exercises can be carried on and with the number of rifle-ranges which are at his disposal.

(*c*) A Naval officer is always attached to the officer in charge of the target practice, in order to afford all necessary information, respecting the rifle-ranges, and to ensure that the regulations concerning them are followed.

(*d*) The Naval Commander-in-Chief acquaints the Head of the Governmental administration of the permission and of the exact time when the practice will commence.

(6) Within the boundaries of the Netherlands India, foreign vessels of war are required to respect the existing legal regulations.

(7) Should any foreign vessel of war infringe any of the foregoing regulations, the principal Civil authority of the place may, if possible in conjunction with the Central Government, order the vessel to withdraw, and, if necessary, the principal Civil authority may use force to compel the vessel to withdraw, but, before doing so, he must first consult the competent Naval and Military authorities.

(*a*) In this latter case the competent Naval or Military authority shall enforce obedience by firing a shot past the vessel at a distance of about 500 yards, then by firing a second shot at about half the distance of the first shot, and, if necessary, by further firing shots over the vessel or into the rigging and finally into the hull.

(8) The Government pilots shall be made acquainted with these regulations and be advised by the Harbour Master, or his Deputy, whether a salute to the Netherlands flag can be returned, and, if so, from what point.

(*a*) The Government pilots shall, as far as necessary, inform the Officer Commanding a foreign vessel of war, of the foregoing regulations, and afford him all the information he may require concerning them.

(9) These regulations apply to vessels of war, belonging to Powers which are involved in war and on friendly terms with the Netherlands, as long as no other regulations, for the maintenance of neutrality, have been made, during, or after, the outbreak of the war.

(*a*) In case of the Netherlands being engaged in war, the same regulations will be enforced, so long as nothing to the contrary has been decided.

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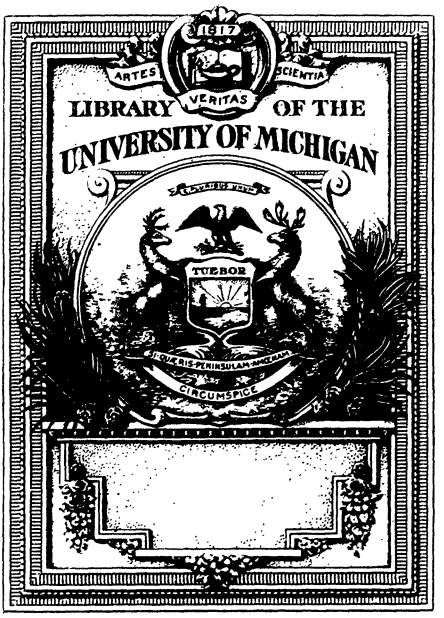

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